National Library of Canada
Bibliothèque nationale du Canada

Canadian Theses Service
Service des thèses canadiennes

Ottawa, Canada
K1A 0N4

NOTICE

The quality of this microform is heavily dependent upon the quality of the original thesis submitted for microfilming. Every effort has been made to ensure the highest quality of reproduction possible.

If pages are missing, contact the university which granted the degree.

Some pages may have indistinct print especially if the original pages were typed with a poor typewriter ribbon or if the university sent us an inferior photocopy.

Reproduction in full or in part of this microform is governed by the Canadian Copyright Act, R.S.C. 1970, c. C-30, and subsequent amendments.

AVIS

La qualité de cette microforme dépend grandement de la qualité de la thèse soumise au microfilmage. Nous avons tout fait pour assurer une qualité supérieure de reproduction.

S'il manque des pages, veuillez communiquer avec l'université qui a conféré le grade.

La qualité d'impression de certaines pages peut laisser à désirer, surtout si les pages originales ont été dactylographiées à l'aide d'un ruban usé ou si l'université nous a fait parvenir une photocopie de qualité inférieure.

La reproduction, même partielle, de cette microforme est soumise à la Loi canadienne sur le droit d'auteur, SRC 1970, c. C-30, et ses amendements subséquents.

NL-339 (r. 88/04) c

Canada

THE UNIVERSITY OF ALBERTA

PROFILES OF UNDERACHIEVING GIFTED STUDENTS

by

ROBERT JAMES McCLELLAND

A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES AND RESEARCH

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE

OF DOCTOR OF PHILOSOPHY

DEPARTMENT OF EDUCATIONAL PSYCHOLOGY

EDMONTON, ALBERTA

SPRING, 1989

National Library of Canada
Bibliothèque nationale du Canada

Canadian Theses Service
Service des thèses canadiennes

Ottawa, Canada
K1A 0N4

The author has granted an irrevocable non-exclusive licence allowing the National Library of Canada to reproduce, loan, distribute or sell copies of his/her thesis by any means and in any form or format, making this thesis available to interested persons.

L'auteur a accordé une licence irrévocable et non exclusive permettant à la Bibliothèque nationale du Canada de reproduire, prêter, distribuer ou vendre des copies de sa thèse de quelque manière et sous quelque forme que ce soit pour mettre des exemplaires de cette thèse à la disposition des personnes intéressées.

The author retains ownership of the copyright in his/her thesis. Neither the thesis nor substantial extracts from it may be printed or otherwise reproduced without his/her permission.

L'auteur conserve la propriété du droit d'auteur qui protège sa thèse. Ni la thèse ni des extraits substantiels de celle-ci ne doivent être imprimés ou autrement reproduits sans son autorisation.

ISBN 0-315-52966-0

Canada

THE UNIVERSITY OF ALBERTA

RELEASE FORM

NAME OF AUTHOR: Robert James McClelland

TITLE OF THESIS: Profiles of Underachieving Gifted Students

DEGREE: Doctor of Philosophy

YEAR THIS DEGREE GRANTED: 1989

Permission is hereby granted to THE UNIVERSITY OF ALBERTA LIBRARY to reproduce single copies of this thesis and to lend or sell such copies for private, scholarly or scientific research purposes only.

The author reserves other publication rights, and neither the thesis nor extensive extracts from it may be printed or otherwise reproduced without the author's written permission.

(Signed).....

PERMANENT ADDRESS:

519 B Michener Park

Edmonton Alberta

T6H 4M5

Date March 6, 1989

THE UNIVERSITY OF ALBERTA

FACULTY OF GRADUATE STUDIES AND RESEARCH

The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research, for acceptance, a thesis entitled Profiles of Underachieving Gifted Students submitted by Robert James McClelland in partial fulfillment of the requirements for the degree of Doctor of Philosophy in Educational Psychology.

.....
Supervisor

.....

.....

.....

.....

Date February 24, 1989

Abstract

The purpose of this study was to examine motivation and strategy to determine the extent to which these themes encompass the profile of the underachieving gifted child. This research utilized a cross-sectional, longitudinal, triangulation design involving students in the 6th, 7th, 8th, and 9th grades in the Edmonton Catholic School System over a two-year time period.

In the first year, students were selected and grouped either as achieving gifted or underachieving gifted. Each group was administered a test battery to measure motivational variables and strategy variables. Motivational variables were measured by Coopersmith's Self-Esteem Inventory, Harter's Scale of Perceived Competence, and Crandall's Intellectual Achievement Questionnaire. Strategy variables were measured by Cornell's Critical Thinking Test Level X, the Paris Reading Awareness Questionnaire, and the Error Detection Task. A MANOVA was conducted to compare underachieving and achieving gifted students on the motivation and the strategy variables. Finally a median split was conducted to group students into eight homogeneous patterns of motivation and strategy.

The second year involved selecting two students, a male and a female from the median split groups (in two groups three students were selected), as well as three students who changed achievement/underachievement classification over the two-year testing period. These twenty-one students formed the representative sample chosen to participate in the second year of research. The second year students were administered a repeat of the tests from the previous year. They also completed the Vygotsky Blocks, Biggs' Learning Process Questionnaire LPQ (modified for Junior High by Biggs and Mulcahy), A Scale of Intrinsic Versus Extrinsic Orientation in the Classroom, and a semi-structured interview. Analysis of the second year data was through a triangulation approach and through the reporting of case study vignettes.

Biggs' model of student approaches to learning, combining motivational and strategy factors, was applied to the second year sample and revealed qualitative differences in the motives and strategies utilized by underachieving and achieving gifted students. A common profile of the underachieving gifted student was not obtained; however, a model of gifted achievement and underachievement was proposed.

ACKNOWLEDGEMENTS

I am pleased to have the opportunity to thank the many people who provided valuable assistance along the way.

This research would not have been possible without my supervisor, Dr. Carolyn Yewchuk. Her insightful direction, valuable suggestions, and patient understanding enabled the study to reach its conclusion.

I have appreciated Dr. Robert Mulcahy's assistance, support, and his openness in sharing ideas and information. Dr. Jim Parsons's constructive advice and literary expertise have been a valuable asset throughout this research. Sincere thanks are also extended to the other member of my thesis committee, Dr. David Baine and to my external examiner, Dr. Joanne Rand Whitmore (Kent State University), for her willingness to serve on my committee and her dedication to gifted education.

I am indebted to Mrs. Annette Stremecki, Coordinator of Testing and Research in the Edmonton Catholic School System for her support of the research. Appreciation is also extended to the schools, the principals, the students, and the parents for their support and interest in the research.

To Patricia, my wife, companion, and partner, I extend a deep appreciation for her assistance, encouragement, patience, and love. I owe her an immense debt! Thanks is extended to my mother Clara, and daughter Erin, who have with patience and understanding sacrificed of their time.

And finally I wish to acknowledge my God, Author and Sustainer of life, my Source and my Strength.

TABLE OF CONTENTS

CHAPTER PAGE

I. STATEMENT OF THE PROBLEM 1

A. Introduction to the Problem 1

B. The Problem 3

C. Overview of the Thesis 6

II. REVIEW OF THE LITERATURE 8

A. Introduction 8

B. Proposed Theories for the Underachieving Gifted 8

Statistical Error 10

Motivational Factors 12

Strategy Factors 14

Summary 16

C. Research on the Underachieving Gifted 18

Psycho-Educational Test Battery Research 18

Intervention Research on the Underachieving Gifted Student 20

D. Qualitative Research on the Underachieving Gifted 26

Hitchfield's Qualitative Analysis of the Underachieving Gifted Student 26

Whitmore's Qualitative Analysis of the Underachieving Gifted Student 28

Stelmaschuk's Qualitative Analysis of the Underachieving Gifted Student 29

Rimm's Qualitative Analysis of the Underachieving Gifted Student 34

E. Directions for Research on Underachieving Gifted 36

A Model for Understanding Motivation and Strategies: Biggs' Model of Student Learning 36

Proposed Achieving and Underachieving Gifted Model 47

F. Definitional Problems of Gifted Underachievement and Definition of Terms 51

Definitional Problems of Gifted Underachievement 51

Definition of Terms 53

G. Limitations 54

III. METHODS AND DESIGN 56

A. Outline of Method 56

B. Subjects 58

Defining Achievement and Underachievement with the Prediction Model 60

Analysis for Determining the Equivalence of Groups Based on the Canadian Lorge-Thorndike 63

Analysis for Determining Differences Between Groups Based on the Discrepancy Scores 65

Summary 66

C. Screening Instruments 66

Canadian Lorge-Thorndike Intelligence Test 66

Canadian Test of Basic Skills 68

D. Assessment Instruments 68

Motivational Measurement 69

Coopersmith's Self-Esteem Inventory 70

Harter's Perceived Competence Scale 71

Crandall's Intellectual Achievement Responsibility Questionnaire 72

Scale of Intrinsic Versus Extrinsic Orientation in the Classroom 75

Strategy Measurement 76

Cornell Critical Thinking Test 78

Paris Reading Awareness Questionnaire 80

Error Detection Task 81

Vygotsky Blocks 82
Interaction Between Motivation and Strategies Measurement 85
Learning Process Questionnaire (Revised for Junior High) 85
Semi-Structured Interview 88
E. Collection of Data 89
F. Analysis of Data 91
G. Hypotheses 92
IV. RESULTS 94
A. Differences in Motivational Factors 95
B. Differences in Strategy Factors 97
C. Grouping for Second Year Analysis 99
D. Consistency of the Median Split for the Sample Over the Two Years 102
E. Results of Test Measures 104
Results of Motivation Measurements 105
Coopersmith's Self-Esteem Inventory 105
Harter Perceived Competence Scale 109
Crandall's Intellectual Achievement Responsibility Questionnaire 112
Scale of Intrinsic Versus Extrinsic Orientation in the Classroom 113
Results of Strategy Measurements 118
Cornell Critical Thinking Test 118
Paris Reading Awareness Questionnaire 119
Error Detection Task 121
Vygotsky Blocks 122
Results of Interaction Between Motivation and Strategies Measurements 123
Learning Process Questionnaire 123
Summary of Test Results 125

Semi-Structured Interview Case Studies 127
High Motivation and High Strategy 127
Low Motivation and Low Strategy 130
Low Motivation and High Strategy 132
High Motivation and Low Strategy 133
Cross-Over on Motives and Strategies 135
Summary of Interviews 137
V. DISCUSSION 140
A. Introduction 140
B. Summary of the Study 140
Motivational Factors 141
Strategy Factors 143
Consistency Over Grade Levels 144
A Common Profile 146
Patterns of Motives and Strategies Between Underachievers and Achievers 148
Model 150
Students' School Perceptions 151
C. Implications for Future Research 152
Sample Selection and Identification Procedures 152
Underachievement Resulting from Learning Deficits 154
Development of the Model 156
Academic Appropriateness and Intervention 157
REFERENCES 161
APPENDIX A 173
APPENDIX B 177

LIST OF TABLES

Table		Page
I	Means and Standard Deviations Across Grades for Total Discrepancy For All Gifted Students	61
II	Breakdown of Subjects by Grade, Achievement, and Gender	62
III	Lorge-Thorndike Full Scale Means, Standard Deviations, and Standard Errors Across Grades	64
IV	Lorge-Thorndike Verbal Means, Standard Deviations, and Standard Errors Across Grades	65
V	Non-Verbal Means, Standard Deviations, and Standard Errors Across Grades	65
VI	Odd-Even Reliability of the Lorge-Thorndike Intelligence Test	67
VII	Post Hoc Analysis for Motivational Variables Between Underachieving and Achieving Gifted	95
VIII	Post Hoc Analysis for Motivational Variables Between Grades	96
IX	Post Hoc Analysis for Interaction with Motivational Variables	97
X	Post Hoc Analysis for Strategy Variables Between Underachieving and Achieving Gifted	98
XI	Post Hoc Analysis for Strategy Between Grades	98
XII	Post Hoc Analysis for Interaction with Strategy	99
XIII	Frequency of Motivational and Strategy Groupings	100
XIV	Chi Square Proportions of Motivational and Strategy Groupings	100
XV	Final Number of Motivational and Strategy Subjects	101
XVI	Grade Six Means, Standard Deviations, and Medians of the First Year Results from Significant Variables	103
XVII	Grade Seven Means, Standard Deviations, and Medians of the First Year Results from Significant Variables	103
XVIII	Grade Eight Means, Standard Deviations, and Medians of the First Year Results from Significant Variables	103

XIX Grade Nine Means, Standard Deviations, and Medians of the First Year Results from Significant Variables..... 103

XX Summary of Interviews..... 138

LIST OF FIGURES

Figure		Page
1.	Elaborated Model of Student Learning (adapted from Biggs, 1987)	37
2.	Motive and Strategy Approaches to Learning (adapted from Biggs, 1985)	39
3.	Decisions Related to Learning Profiles (adapted from Biggs, 1987)	41
4.	Schematic Representation of Achieving and Underachieving Gifted Model	50
5.	Outline of Steps in Method	57
6.	Subjects for In-Depth Study	102
7.	Coopersmith Self-Esteem Inventory (School)	107
8.	Coopersmith Self-Esteem Inventory (Social)	107
9.	Coopersmith Self-Esteem Inventory (Home)	108
10.	Coopersmith Self-Esteem Inventory (General)	108
11.	Coopersmith Self-Esteem Inventory (Total)	109
12.	Harter Perceived Competence Scale (Cognitive)	110
13.	Harter Perceived Competence Scale (Social)	111
14.	Harter Perceived Competence Scale (Physical)	111
15.	Harter Perceived Competence Scale (General)	112
16.	Crandall's Intellectual Achievement Responsibility Questionnaire (Intrinsic)	113
17.	Intrinsic Versus Extrinsic Orientations (Challenge)	116
18.	Intrinsic Versus Extrinsic Orientations (Curiosity/Interest)	116
19.	Intrinsic Versus Extrinsic Orientations (Independent Mastery)	117
20.	Intrinsic Versus Extrinsic Orientations (Independent Judgment)	117
21.	Intrinsic Versus Extrinsic Orientations (Internal Criteria)	118
22.	Cornell Critical Thinking Test (Total Scores)	119
23.	Paris Reading Awareness Questionnaire	120
24.	Error Detection Task	121

25. Vygotsky Blocks 123
26. Learning Process Questionnaire 124
27. Model of Achieving and Underachieving Gifted Profiles 150

CHAPTER I

STATEMENT OF THE PROBLEM

A. Introduction to the Problem

Of interest to educators are factors that differentiate those gifted students who excel in school from those who do not perform to expectation. What is the profile of the gifted student who is underachieving? Is it possible that factors related to motivation and/or strategies may contribute to academic underachievement within the gifted population? This study has been undertaken to gain insight into the profiles of gifted underachievers in relation to gifted achievers in order to suggest a suitable model for future empirical research and to provide an approach to future programming for gifted students.

In recent years, educational legislation has resulted in increased interest and accountability in providing the most appropriate education and opportunity for every student. Studious examination of special population groups, for the purpose of implementing appropriate educational goals, has resulted from such legislation and the need for accountability. The operationalization of educational goals necessitates the examination of special education populations with distinct attributes, abilities, and unique educational needs. One such special education population is the gifted.

Definition of the nature and identification of giftedness is the subject of a debate which remains unresolved. Giftedness is, however, defined in terms of current societal structures and values.

A traditional psychometric approach (Humphreys, 1985) defines giftedness in terms of high intelligent quotients as measured through psychometric instruments. Humphreys (1985) reports that the criteria more commonly used for the selection of children for participation in special education programs for the gifted are defined as those children who score 130 or higher on an I.Q. test.

A multiplicity approach utilizes an hierarchical model which defines the gifted individual as demonstrating outstanding ability in a variety of areas that are valued by

society (Cohn, 1981). Gifted individuals, for example, are viewed by the United States Office of Education (Education Consolidation Act, 1981) as "possessing demonstrated or potential abilities that give evidence of high performance capability in areas such as intellectual, creative, artistic, leadership capability, or specific academic fields, and who require services or activities not ordinarily provided by the school in order to fully develop such capabilities" (Sec. 582). Similarly, Gardner (1983) presents giftedness in terms of the ability to function at a high level of creativity in the linguistic, musical, logical and mathematical, visual and spatial conceptualization, bodily-kinesthetic, intrapersonal, and interpersonal domains.

An enrichment triad approach identifies giftedness on the basis of high academic ability, creative potential, and task commitment (Renzulli, 1977). An information processing approach (Sternberg & Davidson, 1983, 1985) defines giftedness as an effective intercommunication among intellectual processes to problem recognition, problem-solving strategies, mapping of higher order relations, and selection of relevant information (componential functions). Gifted individuals are perceived to have better insight, allowing these individuals to arrive at novel solutions to problems through selective encoding and combining of information.

Potential as well as demonstrated ability has been incorporated into whatever definition of giftedness is utilized. Further, a recognition exists, based on research in developmental psychology, that giftedness can exist prior to visible signs of exceptionality. The multiplicity of current definitions of giftedness not only opens the door to provide opportunity to foster the potential of all individuals with exceptional and diverse talents through the provision of optimum environments, but also allows for the concept of underachieving giftedness.

Current definitions have emphasized the importance of ascertaining the individual's potential in the assessment of giftedness. The assessment, in turn, has shown cases of individuals with discrepancies between their assessed learning potential and their predicted

academic performance. The anomaly of underachieving giftedness has emerged from the emphasis on potential, the wide variety of definitions and assessment procedures, and the accountability for meeting the needs of special populations.

B. The Problem

The critical problem that requires address in the area of the underachieving gifted is the identification of the specific motivational and strategy characteristics of this group, in order to facilitate implementation of research based follow-up programs and environments to assist children to maximize their strengths. Definitions of underachieving gifted, although varying extensively, share a common theme of discrepancy between potential and performance. Achieving to potential is stressed by Horney (1937) since "Failing to live up to one's potentialities prevents the individual from attaining self-fulfillment, the self-actualization of which he is capable, and thus prevents his becoming a truly integrated person" (p. 37). The contribution of educational systems to the healthy emotional and academic development of the underachieving gifted child will be enhanced as an accurate model that is representative of underachievement in gifted students is presented and researched.

This population has, for the most part, been overlooked. Only when the situation becomes unbearable, as in the case of behavior problems, is the aberration of gifted underachievers identified (Ysseldyke, 1983). To date there is no inclusive theory or model for identifying and understanding the causes of underachievement in this population.

There have been numerous chapters and periodicals giving explanations of underachieving giftedness but a paucity of research. The wide variety of definitions on giftedness and underachievement create problems in enabling comparison between articles or replication of studies. A summary of the literature over the past thirty years reveals confusion and non-directiveness rather than clarity and focus in the area of the gifted underachiever. There are problems with definitions, difficulties in the understanding of the

nature of gifted underachievement, a lack of clear identification, and conflicting proposals as to the causes of underachievement. Much speculation surrounds the underachieving gifted that, although appearing valid, must still be regarded as opinion. Underachieving giftedness is a complex topic; therefore, greater effort is required to support opinions and theories with empirical validation.

What appears to be required is a well documented profile of gifted underachievers. In an examination of the current concept of underachieving giftedness as represented by the definitions utilized, identification procedures, purported causes, and intervention programs, two themes emerge. One proposes the child to have limited motivation and advocates counseling as the major treatment intervention. The other examines strategy factors such as critical and creative thinking and learning deficits, advocating the use of information processing strategy remediation.

Research on motivation and strategy variables has been focused on clusters of underachieving gifted students rather than on the population as a whole. Selection of the underachieving gifted student has generally been achieved through obtaining subjects who have been admitted to clinics for testing or students who were receiving special education. These groups, however, may not be typical of the underachieving gifted population. In effect, they might represent the pathological or severe cases of gifted underachievement. Rarely have studies focused on a broad range of underachieving gifted students for the purpose of comparing achieving and underachieving gifted populations on motives and strategies.

The purpose of this study is to examine the two themes of motivation and strategies and to determine the extent to which these themes can be developed into a model of the underachieving gifted child relative to the achieving gifted child.

The specific questions guiding this study are as follows:

(1) Do underachieving gifted students score lower on measures of motivation such as self-esteem, self-perception, and locus of control relative to gifted achievers?

(2) Do underachieving gifted students score lower on strategy measures such as critical thinking skills, reading strategies, and error monitoring skills relative to gifted achievers?

(3) Do motivation and strategy measures of underachieving gifted and achieving gifted students remain constant over grade levels?

(4) Is there one common profile or are there many profiles to describe the underachieving gifted population?

(5) How are motivation and strategy patterns similar and/or different between underachieving and achieving gifted students?

(6) Is there a model that can be applied to underachieving and achieving gifted students that will incorporate motivation and strategy factors?

(7) What are the underachieving and achieving gifted students' perceptions of the school as a milieu for academic achievement?

There is a challenge as well as a responsibility in the education of the intellectually gifted child and specifically of the underachieving gifted child. Gallagher (1975) presents this challenge. He states

> One way to look at the underachiever is that he is in the middle of a circle of barbed wire. It makes up his total environment, and all the elements of his environment have contributed to the building of this wire circle - his family, his friends, his school, and most important, himself. Any movements that he attempts to make to get out of the barbed wire are going to be painful to him. Sometimes it is more comfortable to sit quietly and passively in the middle of this trap and bemoan his own fate than to risk getting scratched trying to get out (p. 353).

Educators have a responsibility to understand the process and profiles of underachievement in order to assist the gifted underachiever to circumvent the barbs by providing an appropriate environment. At present, this understanding is absent. There is, therefore, a challenge to develop a model to enhance the understanding of gifted underachievement and to promote appropriate intervention for the underachieving gifted students.

C. Overview of the Thesis

This research study is an empirical investigation into the profiles of underachieving gifted children and proposes a model describing gifted underachievement. It assumes that the development of potential for the future success of an individual is the aim of education. Intervention programming must, therefore, be in keeping with the actual needs of the child. This research on the profiles of underachieving gifted students is limited to the general areas of emphasis currently attributed to gifted underachievement, that of motivation and of strategies.

In the first year the research involved 164 underachieving and achieving gifted students in grades six through nine attending schools within a Metropolitan Separate School District. They completed three tests on motivation (Coopersmith's Self-Esteem Inventory, Harter's Scale of Perceived Competence, and Crandall's Intellectual Achievement Questionnaire) and three tests on strategies (Cornell's Critical Thinking Test Level X, the Paris Reading Awareness Questionnaire, and the Error Detection Task). Students' personal perceptions and values at the time of the testing session were not investigated; however, anecdotal observations useful for interpreting possible error in testing were recorded. During the second year, 21 of the 164 students were given the complete battery again, as well as individually administered tests and interviews.

The data from the first year were analysed using a MANOVA technique to determine differences and similarities between the underachieving and achieving gifted students. In the second year, a combination of quantitative and qualitative techniques were used to determine similarities and differences between the two groups of gifted students and to assess the efficacy of the proposed model.

The proposed model was based on Biggs' model of student learning which incorporates both motivation and strategy with a distinction being made between potential and achievement. Biggs' model contains three main components - presage, process, and

product performance. Presage refers to the factors present at the time the individual enters the learning situation, process is the type of approach the individual uses in learning, and product performance refers to the outcome of the learning. The adaptation of Biggs' model provided an opportunity to assess both strategy and motivation concurrently in underachieving and achieving gifted students and to test the efficacy of the proposed model.

CHAPTER II

REVIEW OF THE LITERATURE

A. Introduction

This chapter provides a review of the literature and research related to underachievement and giftedness. First, proposed theories of the causes of gifted underachievement are examined and from these causes a two factor focus on motivation and strategy is developed. Second, empirical research with respect to the assumptions surrounding the underachieving gifted is presented emphasizing the motivational factors and the learning strategy factors. Third, qualitative research presenting descriptions of achieving and underachieving gifted children is presented. An underachieving and achieving model is proposed that incorporates motivation and strategy. Finally, definition problems associated with the underachieving gifted are presented along with the definitions of terms used in this research.

From the review of the literature, the necessity for research to examine the profile of the gifted underachiever in the areas of motivation and of learning strategies becomes apparent. The review of the literature reveals various viewpoints and successful intervention strategies based on limited theoretical explanations for the failure of gifted individuals to achieve academically. There is a need to develop a comprehensive theoretical framework delineating the underlying causes of underachievement in the gifted and providing the necessary empirical base for future research.

B. Proposed Theories for the Underachieving Gifted

Central to the understanding of gifted underachievement is the ability to determine why some people achieve at a higher level than their counterparts. Achievement can be viewed as an active process that has as its goal beneficial products. Conversely, underachievement is passive and static, lacking in productivity.

Underachievement in gifted groups is often manifested in children whose academic achievement is significantly below their expected potential. The main thrust of research examining underachievement and giftedness has focused on the motivational aspects related to the family system. Recent efforts are emphasizing strategy factors as purported explanations of underachievement. The following list is a summary of a number of theoretical explanations:

1) Underachievement due to emotional problems (Bonsall & Stefflre, 1960; Bricklin & Bricklin, 1967; Hecht, 1975; Pringle, 1970; Ralph, Goldberg, & Passow, 1966; Whitmore, 1980).

2) Underachievement as an interpersonal defense (Janos & Robinson, 1985; Walker, 1974).

3) Underachievment due to social immaturity (Hecht, 1975; Newman, Dember, & Krug, 1973; Ralph, Goldberg, & Passow, 1966).

4) Underachievement due to family interaction attitudes or patterns, parental attitudes, parental rejection (Abraham, 1981; Gowan, 1957; Rimm, 1986; Shaw & McCuen, 1960; Thiel & Thiel, 1977).

5) Underachievement due to environmental factors such as lower income, fewer social/educational opportunities, single parent, (Gallagher, 1964; Hecht, 1975; Newman, Dember, & Krug, 1973; Pringle, 1970; Zuccone & Amerikaner, 1986).

6) Underachievement as a form of social defense such as pressure to achieve leading to low achievement, deliberate underachievement as in bright females reacting to perceived sex expectations, (Fox, 1981; Shaw & McCuen, 1960; Pierce, 1961; Reis, 1987; Rimm, 1984; Roth & Meyersburg, 1963).

7) Underachievement due to low self-esteem (McHolland, 1971; Ralph, Goldberg, & Passow, 1966).

8) Underachievement due to learning disabilities (Bow, 1988; Bricklin & Bricklin, 1967; Chermak & Burgerud, 1983; Elkind, 1973; Hecht, 1975; Krippner & Herals, 1964; Kvasnicka, & Polak, 1983; Mauser, 1979 Pringle, 1970; Whitmore, 1980)

9) Underachievement due to error in measurement (Anastasi, 1976; Newman, Dember, & Krug, 1973; Robinson, 1977; Thorndike, 1963).

From this list emerge three prominent hypotheses which attempt to account for why clever and highly intelligent children fail to achieve to academic expectations. First is the theory that underachievement is simply a result of errors in the testing instrument. Scores

that are high on most group I.Q. and achievement tests merely reflect the individual's ability in immediate short answer responses, often to multiple choice questions where the answer is embedded in the question. This does not reflect tasks such as projects, written compositions, and classroom assignments required in the academic environment. Second, if the individual has been accurately assessed as possessing high intelligence and is not academically meeting expectations, then motivational conflicts or poorly developed ego functions may be masking the true potential. Environmental influences such as an identification with a poor model or boredom with the educational system may contribute to poor performance. Third is the possibility of poorly developed learning strategies. The student might utilize strategies that are inappropriate for the academic situation or might possess a learning deficit in specific areas that can result in a vicious circular relationship. In this third situation the child avoids the practicing benefits that would allow the attainment of further competence.

Statistical Error

Thorndike (1963) expressed support for the first hypothesis that underachievement really refers to the limitations of instruments of prediction. He states that "there has been a tendency to forget that the aptitude test is, after all, only one sample of behavior from which another, usually somewhat larger and somewhat different sample is being forecast" (p. 3). Thorndike's (1963) point that underachievement can only occur in relation to a standard of expected or predicted achievement does require address. Regardless of the number of related facts about an individual or group that are available, prediction will never be exactly correct for every individual. Description of a standard of human behavior and performance is complex and there is not a perfect correlation between intelligence and scholastic aptitude tests, therefore, some degree of overachievement or underachievement is inherent in prediction. Research in the area of underachievement must minimize the error

resulting from the testing instruments. It must consider the possible prediction discrepancies and question the validity and reliability of the testing instruments.

By comparing intelligence with achievement, Anastasi (1976) has commented that the procedure is misused: no two tests have a perfect correlation and, thus, measurement error will produce either an under- or over- prediction of predicted scores. In order to compensate for the correlation error, Hanna, Dyck, and Holen (1979) proposed five principles to aid in the comparison of academic and intelligence scores. First, derived scores should be based on a national normative sample. Second, before comparing two tests, standardization samples should be studied or ideally the two tests should be standardized on the same national sample. Third, the aptitude measures must be relevant to the subject field and treatment being proposed. Fourth, when comparing aptitude and achievement tests, comparable derived scores should be used. Finally, measures should be placed in standard scores, and not mixed between age and grade scores.

Responding to the complications arising from underachievement being described as a statistical artifact of testing error and procedures, Goldberg (1965) has conceded that "no matter how much of the discrepancy is due to errors of measurement and to statistical artifacts, a part of the dissonance between prediction and achievement probably lies within the social-psychological makeup of the individual" (p. 33). Karnes (1962) in a two-year study of elementary students found that

> The tendency of the subjects to remain in the same relative position when ranked with the other members of their class repeatedly and over an extended period of time suggests that the academic underachiever represents a consistent personality manifestation which is not an artifact or error inherent in psycho-educational measuring devices. (p. 40)

Thus underachievement appears to be more than the result of statistical and instrument error. Cautiously rejecting the first hypothesis explaining underachievement in the gifted as entirely testing error leaves two general theories for underachievement; the motivational conflicts or poorly developed ego functions theory and the learning strategies and/or deficits theory.

Motivational Factors

Motivational theories attribute causes of underachievement in the gifted to areas such as conflict between values reinforced within the family or culture of the individual and that of the educational environment. Underachievement can also be attributed to a lack of environmental nurturance such as may be the case in low socio-economic status families. Limited enriching experiences and exposure to stimulating environments place these individuals at a disadvantage. Similarly, individuals who are highly creative or talented may find the instructional methods unstimulating or not in keeping with their learning styles and react to the environment with a lack of motivation. Material on gifted underachievers has also attributed the source of difficulty for this population to personal problems that in turn interfere with their academic progress.

Rimm (1984, 1986), as one proponent of the motivational theory, believes that underachieving gifted individuals have learned to perform below their potential ability. She considers this form of underachievement to be the result of reinforcement by less than positive environments in the home and/or school. As major factors contributing to underachievement in the home environment, Rimm (1986) cites unconscious identification with underachieving or powerless parents and counter-identification where parents manipulate their children in such ways as being overly helpful or demanding of their child.

Bayley and Schaefer (1964) lend support to the importance of environment in providing motivation. In a longitudinal study examining the correlation of maternal and child behaviors with male intelligence, they found a significant relationship between intelligence and environmental factors, particularly the love-hostility dimension of maternal behavior. Similarly, Kagan, Sontag, Baker, and Nelson (1958) found that children with higher scores on a measure of achievement motivation had scores on an IQ test that increased over 4-year spans. Those who scored low on the achievement motivation test had decreasing IQ scores over the same time.

Literature on the underachieving gifted has demonstrated increased interest in examining the female acculturation process in which sex stereotypes and sex-role restraints appear to result in female gifted underachievement (Eccles, 1985). Conflicting expectations and values are placed on gifted females. Academic abilities are believed to be of value; but, on the other hand, it becomes clear that certain territories are restricted. Gender role beliefs and schema are used to explain differences in educational, occupational, and family-related activities.

A "Domino Theory" has been proposed by Kranz (1975) to explain female underachievement. Kranz asserts that five related factors may result in underaspiration with gifted females. First is a motive to avoid success in order to allow success in other societal goals such as marriage. Second is a difficulty with autonomy or self-concept due to the stereotype of females held by others. Third is a societal devaluation of female contributions in that the female is exposed to the concept that male contributions are more valuable than female. Fourth is the notion that unusual excellence is associated with a loss of femininity. Finally is the belief that the gifted girl's performance is adversely affected when in aggressive competition with males.

Others attribute underachievement to motivational factors resulting from the inability to perform in stressful environments. Maslow (1954) argued that the attainment of higher levels of processing reflects an inner development which is often fostered within difficult and stressful environment situations. These situations can either make or break the individual. Considering Maslow's possibility of a situation resulting in the "breaking" of the child, underachievement in the gifted can result from stressful environmental situations which in turn promote underachievement due to low self-esteem and subsequent personality characteristics. These individual characteristics appear to exhibit an important role in determining the extent to which individuals will combine their cognitive abilities with a productive executive action resulting in successful achievement. As such, gifted underachievers have been described as lacking motivation or being emotionally disturbed

(Ralph, Goldberg, & Passow, 1966; Whitmore, 1980). To date, much of the focus of programs for gifted underachievers which emphasize counseling has been directed by these assumptions.

Strategy Factors

Strategy factors have focused on the concept of metacognition, the process of thinking about thinking (Brown, 1978; Flavell, 1976; Shore, 1982). Although research on metacognitive approaches employed by gifted students appears to have the potential to increase the understanding of giftedness (Shore, 1986), to date there is a dearth of studies that examine the gifted students' thinking processes in terms of strategies. Two current directions which are being investigated are metacognition and giftedness (Shore & Dover, 1987). First are investigations into connections between metacognition, intelligence, and cognitive strategies (Sternberg 1986, 1987; Sternberg & Davidson, 1983). Second are examinations of various learning strategies employed by gifted students (Carr & Borkowski, 1987; Chatman & Williford, 1982; Dover, 1983, Scruggs, Mastropieri, Monson, & Jorgensen, 1985).

Sternberg (1984, 1985, 1986, 1987) and Sternberg and Davidson (1983) have incorporated a theory of intelligence, cognition, and strategies with giftedness. Sternberg's (1987) triarchic theory of human intelligence presents a promising model for examining the cognitive differences of gifted students. Sternberg (1986) presented three components of cognition which are defined as "a mental process that may translate a sensory input into a mental representation, transform one mental representation into another, or translate a mental representation into a motor output" (1986, p. 24).

The first components in the triarchic theory are the internal mental mechanisms or information processing components. These can be subdivided into three basic functions; meta, performance, and knowledge-acquisition components. Metacomponents are used in planning, monitoring, and evaluating performance of a task. Performance components are

the processes used in the execution of a task. Knowledge-acquisition components are those processes used in learning new things.

The second component of the triarchic theory involves experience and intelligence in relation to the ability to automatize information processing and to deal with novel kinds of tasks and situations.

The third component of intelligence in Sternberg's model involves adaptation, environmental selection, and environmental shaping. Adaptation is the ability to function within one's environment. Environmental selection involves the ability to know when to select or withdraw from one's environment when adaptation is not appropriate. When attempts to adapt to a given environment fail or are impractical, environmental shaping capitalizes on the strengths and compensates for the weaknesses of the situation.

For Sternberg (1987), the connection between a gifted student's intelligence, metacognition, and use of strategies is in the suggestion that gifted individuals have a flexible and adaptable repertoire of strategies that are generalizable and extendable to given situations rather than a single cognitive style or strategy.

Other research has focused on one or two particular strategies employed by gifted groups and has compared the gifted with their peers. Carr and Borkowski (1987), for example, examined the relationship between divergent thinking, metamemory, achievement, and IQ in ninety-eight fifth and sixth grade gifted children. A significant correlation was reported between metamemory and divergent thinking and between metamemory and achievement among gifted children. Gifted children high in metamemory (the ability to understand their memory processes) were reported to be more academically successful. These gifted students also were reported to be more creative and more successful in transferring learning from one discipline to other (divergent thinking). Chatman and Williford (1982) investigated gifted grade four students' cognitive strategies in solving problems through a semi-structured interview. Students appeared to be aware of strategies and were effective problem-solvers but had difficulty verbalizing the strategies

they employed. Dover (1983) reported that grade five and grade six gifted students (n = 25) were able to solve a water jar task with greater speed and accuracy and, with a superior ability, monitor errors and express the processes involved in discovering the solution than their non-gifted peers (n = 25). Scruggs, Mastropieri, Monson, and Jorgensen (1985) reported that gifted students were able to spontaneously generate a greater number of strategies and more effective learning strategies than their non-gifted peers particularly in areas of spatial organization and mnemonics. Research into strategy factors appears promising for increasing understanding of the processes gifted students employ and the factors that differentiate achieving from underachieving students.

Summary

Plausible causes of underachievement in the gifted abound but can be clustered into two approaches, either motivational or learning strategies hypotheses. These two approaches to underachievement, summarized by Newman, Dember, and Krug (1973) in the "will and won't" factor present in motivation theories and the "can and can't" factors present in learning strategies theories, assist in categorizing current theories of the causes of underachievement. They state that

> intelligence is not purely defined by a set of ego functions [development] any more than achievement is determined solely by motivational factors. Nor can the relationship between intelligence and the motivation to achieve be expressed in simple arithmetic terms. The study of underachieving gifted children leads us to consider the ever-changing, subtle, complex, and mutually inhibitory or facilitating interactions that occur between intelligence and achievement within the psychodynamic matrix of the developing personality (p. 85).

Unfortunately, to date there has been little research conducted on the underachieving gifted to support either the motivational or the learning strategies approach and thus the characteristics of this population with regard to these two parameters are still very much conjecture.

If the assumption is adopted that underachievement is a learned phenomenon then approaches to this population would focus on counseling to foster self-esteem and promote motivation. Through counseling directed at motivation, the underachieving gifted student will interpret accomplishments as successful and gain self-esteem and self-confidence. Changes may be required in the home and school environment to promote and maintain an achieving pattern. By providing underachieving gifted children with a feeling of success and changing the reinforcement received from home and school, they would become aware of the relationship between their efforts and success would be fostered. Reversing the learned behavior, by identifying and modifying the reinforcement taking place in the home and school, should result in achievement and productive independence.

If the cause of underachievement is attributed to learning strategies, then a different intervention must be formulated. In this situation, the emphasis is on nurturing gifted children's growth while remediating their information processing problems. Negative, self-destructive behavior is viewed as an outcome of feelings of inadequacy and shame resulting from the disability. As a defense mechanism and in an attempt to cope with the conflicting abilities Whitmore (1980, 1988b) cites various nonproductive reactions occurring such as avoidance, absenteeism, complaining, projection, devaluing others, daydreaming or hatred. The parent's role is seen as one of encouragement, provision of support as well as intellectually stimulating environments and the promotion of self-discipline. Assistance may be offered in terms of supervision of homework and organization, tutoring, and advocacy of alternative testing methods in keeping with the disability. When underachievement is attributed to learning strategies, it is essential to understand the problem, encourage and nurture the giftedness, and provide support to promote a positive self-image in view of the conflicting messages of precocity and weaknesses.

C. Research on the Underachieving Gifted

The number of studies that have focused on the profiles of gifted underachievers is very limited in scope. Studies conducted on the underachieving gifted have focused on either a particular cause of underachievement or the effects of an intervention program for underachieving gifted students. The next section will present research that has examined the profiles of underachievers through a psycho-educational test battery approach. Since research into the underachieving gifted has also focused on the effects of treatment programs, intervention research on the underachieving gifted student will also be presented. Finally qualitative research on underachieving gifted students based on interviews and case studies will be reported.

Psycho-Educational Test Battery Research

Research, such as Tidwell's (1980) which examined a large number of gifted students on a variety of measuring instruments to obtain a psycho-educational profile of the gifted student, has not been undertaken for the gifted underachiever. The closest such research available for underachievement is by Davis and Connell (1985) on the gifted versus normal and the underachiever versus achiever on variables of self-evaluation processes, motivational processes, and control (internal versus external locus) understanding.

The purpose of the Davis and Connell (1985) study was to examine the independent and joint effects of aptitude and achievement on self-esteem processes in grade four, five, and six students. One hundred and twenty-two volunteering students ranging in age from eight to twelve were obtained from two school districts in a northeast metropolitan area. Males and females were approximately equally distributed. The subjects were grouped into one of four groups (2 X 2 factorial design) based on the Otis Lennon Mental Ability Test for IQ and the Stanford Achievement Test or Metropolitan Achievement Test for

achievement. The groups consisted of gifted underachiever (N = 15, mean IQ = 134, achievement = 6.0), gifted achiever (N = 38, mean IQ = 136, achievement = 9.0), normal achiever (N = 56, mean IQ = 103, achievement = 6.4), and normal underachiever (N = 16, mean IQ = 107, achievement = 4.9). Each group was administered the Perceived Competence Scale for Children (Harter 1982), Intrinsic versus Extrinsic Orientation in the Classroom (Harter, 1981), and the Multidimensional Measure of Children's Perceptions of Control (Cornell, in press).

Underachieving students reported themselves to be performing less well in the classroom than students who were performing to their ability. The underachievers credited their successes and failures to lack of effort on their part. Results indicated that the underachievers were willing to take responsibility for the outcomes of their learning to a greater extent than the achievers. No significant differences between achievers and underachievers on any of the self-related constructs measured were indicated from the study. Davis and Connell (1985) concluded that "self-system concomitants of underachievement were not uniform across underachievers. More detailed analyses of types of underachievers within aptitude groups are necessary if the complex relationships between ability, effort, and the functioning of the self-system, are to be full elaborated" (p. 135).

McClelland (1987), in a more elaborate investigation between ability, effort, and the functioning of the self-system, tested a sample of students in grades 6, 7, 8, and 9 who were defined as gifted but demonstrated through a multiple regression a discrepancy between ability and achievement. A total of 164 students were selected of which 87 were underachievers and 77 were achievers. The Crandall Intellectual Achievement Responsibility Questionnaire was administered to measure locus of control (the source of control individuals believe they possess when assessing a situation). Locus of causality (source of motivation related to the need for a sense of personal causation for their actions) was measured through a comparison of performance on two Unusual Uses Tasks, the first

task without reward and the second task with reward. No significant differences between underachieving and achieving gifted students on internal positive, negative, and total locus of control and on internal or external locus of causality were reported.

The necessity of further research on the profiles of gifted underachievers and a model to approach gifted underachievement is apparent not only to understand the independent and joint effects of motivational factors but also to examine the relationship of underachievement with learning strategies.

Intervention Research on the Underachieving Gifted Student

Terman and Oden (1947) appear to have launched the investigation into the underachieving gifted child in their comparative study of 150 men who had exhibited a poor level of achievement with 150 highly successful men. Four characteristics emerged on self-rating tests and ratings by their wives and parents. Bright underachievers, when compared with bright achievers, appeared to have a lack of self-confidence, an inability to persevere, a lack of realistic goals, and the presence of inferiority feelings in common. It was also found that the characteristics that distinguished the successful from the unsuccessful gifted person were noticeable when the underachievers were as young as ten years of age. This finding led to intervention programs for the underachieving gifted individual which focused on social and personal development through counseling. Terman and Oden felt that by remediating the personality problems the academic underachievement would also be treated.

The research project entitled "The Efficacy of Two Organizational Plans for Underachieving Intellectually Gifted Children" by Karnes, McCoy, Zehrbach, Wollersheim, and Clarizio (1962) dealt with the effectiveness of counseling intervention alternatives with underachieving gifted students. The level of achievement of intellectually gifted underachieving elementary school students was assessed. Intelligence was measured through the vocabulary scale from the 1937 Stanford-Binet test, teacher referrals, and

group achievement and intelligence tests. Achievement was measured through the California Achievement Test, the Perceived Parent Attitude Scale, the California Test of Personality, and two creative ability tests from the Guilford Model. One group of underachievers was placed in a class of high achievers while the other group was placed in a regular class. Neither group received modifications in the regular curriculum. Karnes hypothesized that the underachievers with the achieving models would be stimulated to increase in their level of achievement, be more creative and would find peers and parents more accepting of them.

Subjects in the Karnes, McCoy, Zehrbach, Wollersheim, and Clarizio, (1962) study were obtained from two large elementary schools serving an upper-middle class socio-economic area. Students found within the IQ range of 120 or higher and whose achievement discrepancy was found to be one standard deviation or more below the mean as measured by the Horn (1941) formula were considered to be underachievers. Twenty-five underachieving gifted students were placed with high achievers and twenty-three underachieving gifted students were randomly interspersed among regular classes at their grade level. The cross-sectional, longitudinal study was conducted over a two-year period spanning grades two through five.

After considering that the group placed in the achieving classes had a significantly higher I.Q. and lower mean achievement discrepancy than the group randomly assigned, Karnes, McCoy, Zehrbach, Wollersheim, and Clarizio, (1962) rejected as insignificant the limited differences noted for the achieving class in academic achievement and perception of parent attitudes. Neither was there a significant difference in creativity and perceived peer acceptance. Although exposure to a greater concentration of ideas, concepts, and interests found within the high achieving classroom did not have a detrimental effect, results from this research would suggest that in order for underachieving gifted students to succeed academically more than placement in highly achieving classes will have to be considered.

Mallinson (1963), a researcher with the Toronto School Board, examined three treatment procedures with groups of gifted underachieving students in the junior high grades. Part of the sample labeled the "Human Relations Group" received guided sessions oriented to the discussion of feeling and interpersonal dynamics. A second sample called the "Academic Group" was presented with and allowed to discuss scientific and other related subjects. The third sample of underachieving gifted students called the "Individual Sessions Group" received sessions similar to the Human Relations Group but the treatment was conducted in the home school of the student by a counsellor or guidance teacher directed only by the instructions that they were to "take a personal interest in the student." Intervention time in all three groups amounted to approximately one and one-half hours weekly. The fourth sample acted as a control, receiving no other intervention than the usual school routine. The study examined 37 students who scored 120 or above as measured by the Stanford-Binet individual test of intelligence. Underachievement was measured by the student having repeated a grade, or having passed on trial or being unable to cope as judged by the teacher or principal or being six months or more below their grade level on any standardized test of achievement.

Mallinson (1963) hypothesized that gifted underachieving children who received either of the three intervention programs would improve in areas of personality, teacher perception and achievement. Intervention was conducted over a one-year period and post-test results on the California Test of Personality, on a Teacher's Confidential Report, and on the Metropolitan Achievement Test were compared with pre-test scores.

Results indicated that both the Human Relations Group and the Academic Group demonstrated significantly positive gains in personal and general adjustment over the Individually Counselled and the Control Groups. Discussion groups, whether emphasizing feelings and interpersonal problems or scientific interests, appeared to promote psychological adjustment. Of greater significance to academic progress was the discovery of no discrepancy between any of the four groups on academic gains as

measured by the Metropolitan Achievement Test. Since a goal for the education of the gifted underachiever is improvement of academic performance, it appears that group counselling, academic discussion groups, and general individual interest expressed on the part of the school guidance counsellor were no more effective than no intervention at all for academic achievement. In this study, personal adjustment gains showed no transfer into academic gains. Mallinson (1963) concludes his research with the statement

> We should not be overwhelmingly surprised if our efforts to treat therapeutically the personally maladjusted underachiever result in an improvement in his personality but not necessarily in his achievement. While it may be socially desirable to accomplish the first of these goals, we must not assume the automatic attainment of the second. Once this fact is recognized, we can perhaps devote our attention to the problem of the underachiever from other previously unexplored perspectives, instead of continuing to operate on the basis of unproven common sense assumptions (p. 22).

The evidence is far from conclusive that emotional adjustment is the panacea for all the needs of the underachieving gifted student.

Dalsem and Finney (1963) similarly conducted research to examine the long-term effect of group counselling on the problems of the underachieving gifted child. The subjects were high school students in the top 25% in expected aptitude as measured on the Differential Aptitude Test but with grade averages considerably below the mean. The experimental group contained an N of 92 while the control group which was randomly selected had an N of 100. The experimental group was counselled by professional staff with at least a year of training in group work. Dalsem and Finney hypothesized that group counselling should result in higher grade-point averages as well as improved self-concept, teacher attitudes, attendance patterns and behavior, and study skills. Counselling occurred over a two-year period with sessions on a weekly basis.

Grades and study habits did not change on an absolute level or when compared with the control group. Evaluation and indications of change in personality were measured by the California Study Methods Survey, a Student Behavior Questionnaire, and the California Psychological Inventory on a pre-test and post-test comparison. There was an

increase in self-confidence, improved teacher ratings and fewer absences with the experimental group over the control. Although these areas indicated that intervention had measurable beneficial effects, the desired increase in academic performance was not supported.

The extensive program for gifted underachievers entitled "Project Self Discovery," designed by Purkey (1967), used an extremely well-developed curriculum for counselling the gifted underachiever. It was planned in accordance with the theory of education for the gifted emphasizing that

> (1) education should systematically broaden and deepen the bright student's experience in both intellective and non-intellective areas beyond normal school fare, and (2) the responsibility and commitment of the student in his own education should be maximized. (p. 3)

Purkey worked with an experimental group of 44 students and a control group of 40 gifted underachieving students from nine Florida high schools. Bright underachievers were defined as students who had scored above the 75th percentile on the School and College Ability Test in the ninth grade but had a grade point average of C or below in the 10th and 11th grades.

Underachievement was felt to be a result of the student's attitudes and personality. "Project Self Discovery" provided reading and writing exercises to encourage the students to pursue their interests and abilities. Purkey hypothesized that the experimental group would score higher on personality characteristics, would evidence a more accurate self-insight and would increase their grade-point average to a significant level over the control group who had no participation in "Project Self Discovery." Again, even with a highly structured counselling program, although there were some marginal signs of improvement in the experimental groups on personality characteristics, there was no noticeable growth in academic achievement above the control group. Thus, projects that emphasize the personality characteristics, although useful in the development of the student's self-image

and insight, do not appear to carry over into the remediation of academic underachievement.

Whitmore (1980) identified 27 underachieving gifted students (20 males and 7 females) who were placed for one to two years in a special program. Subjects exhibited a discrepancy between measured aptitude and achievement, demonstrated a history of underachievement, had records of poor performance in the basic skill areas, and exhibited signs of emotional and/or social impairment. Intervention involved the structuring of an educational environment that emphasized understanding and empathy, reduced external pressures, structured opportunities for success, set realistic goals, provided an appropriate curriculum, taught coping skills, communicated respect and acceptance, and worked closely with parents and students. These modifications were translated by Whitmore (1980) into four major goals: "a) changing classroom behavior, b) modifying self-perceptions and building self-esteem, c) developing social skills for citizenship and leadership, and d) remediating the academic deficiencies to close the gap between aptitude and achievement." (p. 198). The project emphasized modification of the educational program to develop motivation and foster a positive attitude toward schooling.

Individual and group counselling within the context of the classroom was provided for students. Classroom organization, instructional style, and curriculum were also modified to suit student needs. A philosophy centered on the priority of addressing social and emotional needs enabled students to respond in an appropriate manner to curriculum and instruction. Data on the efficacy of the experimental program are incomplete; however, material collected suggests changes in underachieving gifted students' social behaviour, self-concept, locus of control, and academic achievement over the two years in the project. Significant program effects were reported through teacher reports and student attitude questionnaires for graduates who returned to classes for the gifted or to a special program. Students who returned to the regular classroom do not appear to have demonstrated a similar degree of success.

The two major intervention approaches focus on either counseling to build the self-image and motivate the child or on changing the classroom environment to enhance areas of deficits (Gallagher, 1979). The common thread between both approaches has been their limited success and lack of documented long-term change (Baymur, & Patterson, 1960; Finney & Dalsem, 1969; Gallagher, 1979; Ohlsen & Gazada, 1965; Raph, Goldberg, & Passow, 1966, Whitmore, 1980).

D. Qualitative Research on the Underachieving Gifted

Hitchfield (1973), Whitmore (1980), Stelmaschuk (1986), and Rimm (1986) have reported on gifted underachievement utilizing an interview and case study approach. Hitchfield (1973) reported on Britain's National Children's Bureau longitudinal research on selected students born in 1958. A number of case studies are presented of students who were academically talented but performing at a significantly lower level than expected. Whitmore (1980), using a model of intervention with gifted underachievers in a Cupertino School District elementary school, recorded and interpreted observations and characteristics of her students and the results of her program. Stelmaschuk (1986), in the study of identified and unidentified gifted students, conducted a semi-structured interview with students who were not achieving to expectation. Rimm (1986) reported on a variety of gifted underachieving profiles observed in remedial programming conducted from a clinical perspective.

Hitchfield's Qualitative Analysis of the Underachieving Gifted Student

The National Children's Bureau in Britain conducted a longitudinal study with nationally selected students born in 1958 during the first week in March in England, Scotland, and Wales. The first assessment, representing approximately 17,000 children, was an examination of the infants' sociological, obstetrical, and medical information. A follow-up was conducted on the students in 1965 and 1969, gathering information from

schools, parents, school health services, and individually administered test batteries. Hitchfield (1973) reported on the data on intelligence, educational achievement, social, and emotional adjustment collected for the gifted sample.

Selection of students for the gifted sample was obtained through results on the Goodenough Draw-a-Man test score, high attainment in reading and number work, and parents' recommendation. A total of 238 students (125 boys and 113 girls) were finally selected to be interviewed. One interview session was scheduled for each child comprised of a semi-structured interview and test battery that required approximately three hours for administration. The total assessment battery was comprised of the Weschsler Intelligence Scale for Children, a measure of propositional logic (Lovell & Shields, 1967), general information questions, social reasoning from the New British Intelligence Scale of Social Reasoning, questions requiring divergent thinking, the Barron-Welsh Art Scale, a sentence completion task, and an interview schedule.

Hitchfield (1973) reported thirteen cases of underachievement in the 238 gifted student sample. Underachieving gifted was defined as students with IQs over 130 but having two or more ratings in the middle 40 per cent of the age group or below. This criteria resulted in one girl and twelve boys being classified as underachieving gifted. Descriptions of the underachieving students' profiles were presented but no attempt was made to produce a model or to determine a cause for gifted underachievement.

Reasons were not evident for the girl's underachievement from the written case study vignette. She was described as a shy and self-conscious person from an average family. Her only concern was that her marks might not be high enough to become a teacher; however, she was above average in the subjects required to pursue a teaching career. From the descriptions presented, the reason for two of the twelve boy's underachievement was not evident. Five of the boys appeared to have motivational problems; four appeared to have a concentrated, limited, focused area to the exclusion of all other subjects and the other students' underachievement was attributed to family conflicts.

For one of the boys, it is difficult to determine whether motivation or the use of poor strategies might account for the underachievement. The last four boys appeared to exhibit poor learning strategies and/or deficits. These boys lacked self-confidence in particular areas, usually reading or writing, and/or demonstrated extreme difficulty in performing to the standards in an academic area despite the expressed desire to do well in that area and to pursue a professional occupation.

The argument for the presence of underachievement in the gifted population is strengthened by Hitchfield's (1973) study. Despite the careful selection of a sample to represent the gifted population, supplementary investigation was required to accommodate those students observed as gifted underachieving. Through observation of Hitchfield's case studies, the gifted underachieving group of students did not appear to be homogeneous. The disproportionate number of boys to girls also indicates a need for caution in further studies to include gender in gifted underachievement. Hitchfield (1973) reported no general tendency for underachieving gifted students to possess an external locus of control, to be over-aggressive, poorly adjusted, or lacking self-confidence. Unfortunately the reporting of the cases of gifted underachievement is incomplete and was included as supplementary material. Motivational and strategy factors, however, continue to emerge as characteristics of the gifted underachiever and will require investigation in the profiles and models of gifted underachievement.

Whitmore's Qualitative Analysis of the Underachieving Gifted Student

Whitmore's (1980) Cupertino project utilized a case study approach to inquiry with gifted underachieving students ranging from age 5 through 9 who were failing to achieve academically. The project involved a self-contained classroom treatment setting where objective and subjective data were collected. The focus of the research was on the etiology of academic failure in the gifted and the effects of an intervention program. Whitmore (1979) reported three categories of causal factors to explain underachievement: a)

psychological or personality characteristics, b) physical or developmental characteristics, and c) social and academic environmental factors. The problem behaviours gifted underachieving students manifested were perceived by Whitmore (1980) as coping mechanisms employed by students rather than the cause of underachievement.

From Whitmore's (1980) Cupertino program, four major etiological types of gifted underachievers are reported. Learning disabled, behaviourally disordered or emotionally disturbed, neurologically handicapped, and paralyzed perfectionist provide a categoric framework for the majority of gifted underachieving cases. According to Whitmore, the "learning disabled" student demonstrated high ability while exhibiting specific deficits areas. The "behaviourally disordered or emotionally disturbed" student reacts to failure experience through socially and academically inappropriate behaviours. "Neurologically handicapped" students appear to be developmentally delayed or to experience maturational lags that can be overcome with time. The "paralyzed perfectionist" has developed inhibiting fears of failure that develop into a school phobia and perfectionism. The interaction between the student's actual or perceived deficits and a personality trait of perfectionism and/or supersensitivity are purported to be the predominant cause of gifted underachievement. The theoretical foundation for gifted underachievement is thus reported by Whitmore (1980) to be socioemotional or psychological in nature.

Stelmaschuk's Qualitative Analysis of the Underachieving Gifted Student

Stelmaschuk's (1986) research on the differences between identified and unidentified gifted populations compared students selected from measures obtained on the Lorge-Thorndike test and an achievement test. The research study predominantly sought to examine the relationship between giftedness, socio-economic status, and achievement variables for a group of "identified gifted" and "unidentified gifted" high school students. Two distinct groups of grade ten, eleven, and twelve students were obtained. One group was officially identified and labelled as gifted in the elementary grades by the school system

and had participated in gifted programs. The other group was not identified as gifted, despite having I.Q. scores in the gifted range, and thus they had not participated in gifted programs. The sample was highly selective, comprising all grade ten, eleven, and twelve students currently in the district who had scored within the gifted range in grades six or nine. Giftedness was operationally defined as obtaining an I.Q. test score of 130 or above on either a group I.Q. or an individual I.Q. test and having achievement on standardized achievement tests of scores approximately two standard deviations above the mean.

Qualitative interview data were obtained on 59 students who demonstrated scores differing from expected on achievement as measured by grade point average. Interviews were conducted to examine high achieving (N = 21) and low achieving (N = 38) students' beliefs and values about school and achievement in order to account for factors underlying differences in achievement. Low achievers comprised those students who scored below 70% grade point average in junior and senior high school. High achievers were those who scored above 70% grade point average. The interview sample was comprised of an equitable representation from different socio-economic groups and from high and low achievers. Emphasis was placed on grade twelve students since it was assumed they were in the best position to reflect upon their academic experience.

This method of obtaining the population produced a weakness in the provision of an adequate control. The examination of data ex post facto created the impossibility of controlling the test situation and instrumentation. Testing situations and achievement tests cannot be assumed to be evaluated according to the same criteria. Since selection of low achieving and high achieving students was made on the basis of grade point average, individual teacher's evaluation criteria and values could bias results and complicate comparisons of student's performance.

In an attempt to represent various socio-economic groups, five high schools in different economic communities were selected for participation. Socio-economic status areas were determined on the basis of social and economic communities rather than the

individual students in the sample. Generalization of residential data rather than determination of individual families' stated incomes or occupational levels bring to question the true socio-economic status of the sample tested.

An even distribution of students was selected from each of the five schools chosen so as to be able to conduct all interviews within one to one and one-half days, thereby, preventing questions from being discussed among students. Given the small size of the schools and the high probability that interviewed subjects were acquainted with each other beforehand, it is extremely probable that some degree of spontaneous response was lost due to prior discussion of the questions among cohorts. Techniques of prior institutional contact, knowledge of the area of sub-culture of giftedness, use of open-ended questioning techniques, and the establishment of an unstructured atmosphere were used to promote valid responses. General questions were asked such as "likes and dislikes" and "what are your goals and aspirations in life?". Other questions were directed toward obtaining information about the school environment such as "does the 'ideal teacher' make a difference," "is the comment 'school is boring' fact or fiction," and "do you feel you could do better in your own academic achievements." Students' statements from the interviews were kept in the form of field notes.

These notes were later analyzed based on interpretation and inferential explanation. The purpose was to determine

> some of the structural constraints affecting student achievement and the way in which norms and values of the 'achievement oriented' society had been internalized. It was also expected that inner tensions and the degree to which failure and success had been internalized would be revealed.(p. 135)

It was assumed that verbal responses to questions accurately reflected the students' attitudes and behaviors. It was also assumed that students were affected in similar ways by similar social or structural situations. Finally, there was an assumption that a causality between achievement and attitude does exist. The manifested achievement behaviors were

assumed to be congruent with the expressed social attitudes. Similarly, achievement was limited to school success and not endeavors outside the school.

Results from responses related to attitudes toward self indicated that high achievers were

> well aware of their capabilities but few took them for granted. They recognized their strengths and weaknesses, acknowledging they were not equally talented in all areas but feeling that generally, they were quick learners. Few felt they were brighter than other students, indicating that if other students worked as hard as they did, they would do just as well. There was an equation, then, between being a good student and being smart. They knew that if they exerted more effort, they would be better students and get higher grades but many felt they were too lazy to do so. Thus, they knew they could succeed at whatever they tried, suggesting that they felt positive about their abilities and had an internal locus of control. Probably most important was that they appeared to willingly conform to teacher expectations, at least to the degree necessary to obtain good grades. They wanted to be academically successful; they knew they had the ability to be successful and did whatever was necessary to ensure that success. (p. 272)

In contrast, low achievers' self-attitudes were reported to be

> not interested in being the highest achievers even though they knew they were capable -- 'I understand the work, just don't put in the effort'. It was not important to be the best. Therefore, because of their own value systems, they appeared to be unwilling to conform to play the game. They knew what was expected of the good student and knew also they could achieve better if they tried but two things essentially prevented them. Their study habits were poor and they were not motivated to improve. Like high achievers, they did not doubt their ability to be better students and earn higher grades, but they were unwilling to conform to the degree necessary to do so. (p. 275)

Stelmaschuk (1986) concluded that further research into self-perception, perceived competency, and locus of control is required to strengthen the reliability of these conclusions.

Personal goals and aspirations for high achievers predominantly included university ambitions along with definite goals in mind. Of the low achievers interviewed, approximately half were uncertain about their future and almost all were uncertain about university attendance. A significantly higher number of the low achieving students when

compared with the high achievers indicated career goals involving skilled and/or semi-skilled occupations.

High achievers' values were more consistent with other high achievers than the clustering of value ranking observed between low achievers. From a choice of twelve categories, the high achievers ranked school, friends, family, and personal development significantly higher than church/religion, job/work, sports, happiness, health, money, rewarding career, and hobbies/interests. Low achievers' ranking demonstrated high value on friends, moderate loading on parents/family and hobbies/interests, and a mixed low loading on the other selections. High achievers reported more satisfaction from school and friends, whereas low achievers placed greater value on their friends and outside interests. High achievers placed greater value on school. It was assumed that since high achievers generally had university ambitions, education played an essential role in obtaining their goals. School for the low achiever was not a primary factor in the attainment of future goals.

Through the qualitative interpretation from the interviews with low achievers, a number of common characteristics were presented. They included

a. an external locus of control; in some cases, a feeling of helplessness and not being responsible for one's own actions;

b. low motivation for school work;

c. dislike and/or ambivalence toward school;

d. friends with similar beliefs and attitudes;

e. poor study habits, little homework done and/or incomplete, unwillingness to complete tasks;

f. low self-discipline and tendency to procrastinate;

g. low levels of persistence in classroom work;

h. withdrawal from competitive situations;

i. few and/or no hobbies or interests; in some cases, too many hobbies and outside interests;

j. low aspirations, no clear idea of future goals;

k. pressure from parents, teachers, peers and/or self;

l. hostility toward parents and/or teachers;

m. rebelliousness/ resistance to conformity;

n. impatience with routine learning and 'dull' classes;

o. feelings of victimization. (p. 348)

Stelmaschuk (1986) concluded that low achievers differ from high achievers in their lack of necessary work habits and commitment to do better but did not differ on their ability to perform tasks. Although Stelmaschuk (1986) did not directly examine motivation and strategies factors for underachieving and achieving gifted students on school related tasks, her research does suggest that motivation and work habits (learning approaches) might be contributing factors to underachievement.

Rimm's Qualitative Analysis of the Underachieving Gifted Student

Rimm (1986) reported on gifted underachieving causes and cures based on psychological practice with academically unsuccessful talented children. The sample was predominantly obtained from middle class children with supportive parents who were involved and concerned about their child's academic progress. Rimm (1985) identified five factors that contribute to underachievement: competition, responsibility, control, achievement communication, and respect. Reactions to these factors are reported to result in underachievement, expressed in conformity or non-conformity and dependent or dominant behaviour.

Rimm (1986) presented gifted underachieving vignettes obtained from the four attainable combinations between conformity and non-conformity, dependent and dominant behaviours (dependent conformers, dominant conformers, dependent non-conformers, and dominant non-conformers).

Dependent conformers are personified by Perfectionist Pearl, Poor Polly, and Passive Paul. These students are presented as being quiet and pleasant but very manipulative. When faced with a task requiring work, they will often seek assistance from others rather than exert the effort to solve the problem independently. Dependent conformers tend to be sensitive people that are able to relate well to others but will rarely exert leadership.

Dependent non-conformers are personified by Sick Sam, Taunted Terrance, Depressed Donna, and Torn Tommy. These students exhibit the greatest degree of dependency and tend to be noticeably sad or in need. They are often the students that are victimized and the target of abuse by other students. Both dependent conformers and dependent non-conformers manipulate caregivers for assistance since refusal would leave the helper with guilty feelings. These students manipulate others by conveying needs in the form of love me, help me, protect me, shelter me, and/or empathize with me.

Dominant conformers are personified by Social Sally, Jock Jack, Academic Alice, and Dramatic Dick. These students are often not considered to be underachievers. School marks are generally in the average range and obtained through minimal effort. They appear competitive but generally are not willing to take risks. Efforts are focused on areas where they can excel and tend to be directly proportional to the obtainable external rewards. Dominant conformers are dependent on admiration and praise. Leadership emerges from the degradation of others, such as teachers or people in authority.

Dominant non-conformers are personified by Manipulative Mary, Creative Chris, Rebellious Rebecca, Bully Bob, and Hyper Harry. These students are generally depressed and feel they lack control. Dominant non-conformers are rebellious to "establishments" and tend to place blame for situations on their family or school environment. Their identity is formed through opposition and struggle with people in authority and through success in power struggles. A sense of 'enjoyment' is obtained through observing how far they can push, be different, and disagree.

Visualization of Rimm's underachieving gifted children is assisted through the reporting of student vignettes. Rimm's (1986) focus has predominantly been with students who have been identified using the Achievement Identification Measure (AIM) measure by concerned parents or teachers. The sample consists of identified and quite possibly 'extreme pathological' cases recommended to the clinic for assessment and remediation. Bias in areas such as socio-economic class, family background, and the dominant role of the family in contribution to underachievement is evident. Rimm's perspective is also strongly based on family dynamics and assumes underachievers have an external locus of control and causality which is not always evident with underachieving gifted students (McClelland, 1987).

E. Directions for Research on Underachieving Gifted

It would be useful to have a common perspective and model for gifted underachievers to aid in identification procedures, determination of possible causes and factors that are antecedent to underachievement, and provision of an accurate theoretical framework for necessary intervention. Research, involving a comprehensive sample of gifted underachievering students, is required to provide a model for further examination of the effects and interaction of motivation and learning strategy factors.

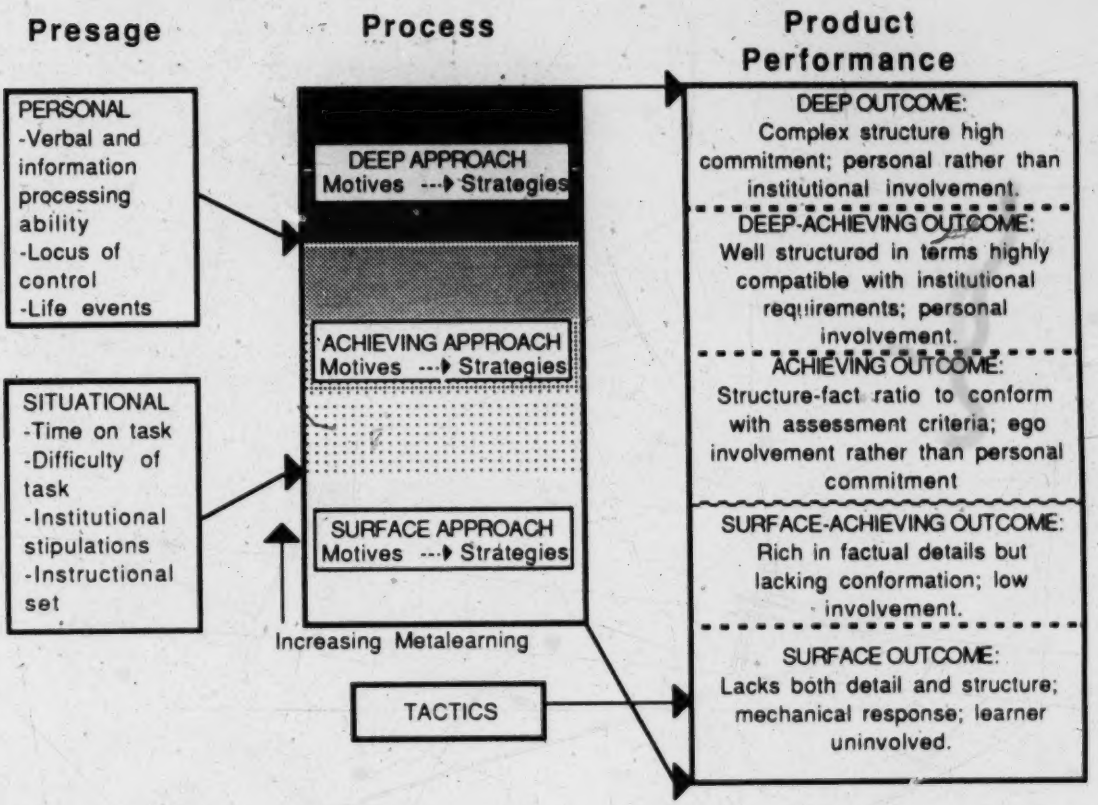
A Model for Understanding Motivation and Strategies: Biggs' Model of Student Learning

The predominant focus of research on the underachieving gifted is in the area of motivation and strategies. To date, a model of the gifted incorporating both factors has not been proposed. Biggs' (1987) research, however, has examined students' approaches to learning and studying from a motivation and strategy perspective. He also provides a distinction between potential and achievement. Accordingly, Biggs' (1987) model appears

appropriate as a framework for incorporating motivation and strategies with potential and achievement for gifted students (see Figure 1).

Figure 1

Elaborated Model of Student Learning (adapted from Biggs, 1987)



Presage factors exist before the individual enters a learning situation and involve both personal and situational components. Personal factors include abilities, locus of control, and previous experience. Personal factors consist of prior knowledge, intellectual ability, values and attitudes, and personality characteristics. Abilities include both general verbal ability and information processing abilities. Locus of control and experiential factors are content-specific and involve prior knowledge relevant to a task. Situational factors

include the time spent on a task, the difficulty of the task, and the structure and weighting of a course. The situational factors also include the nature of the task, institutional differences, and instructional set such as assessment and institutional requirements.

The presage factors directly influence product, the performance or achievement of the individual, and also indirectly influence process. Process includes the intervening variables between potential (presage) and achievement (product). Process is categorized by three approaches to academic learning. First is the deep level approach where motivation would be intrinsic arising out of interest and competence in academic subjects. Strategies would be at a meaningful level where the student would be widely read and able to interrelate previous concepts with current situations. Second is the achieving level where motivation is based on competition and ego-enhancement. The emphasis is on obtaining high grades regardless of the interest in the material or subject. Strategies employed at this level are based on organizing, scheduling time, following directions, and exhibiting a model student behavior. Third is the surface level approach where motivation is only at a pass aspiration with a corresponding fear of failure. Strategies employed by such a student would be limited and much of learning would be rote. The motivational mix of deep, achieving, and surface consequently results in the strategy adopted. This model thus presents six components of the learning process complex, three of motive and three of strategy (see Figure 2). These components logically combine to form three approaches each with a motive and a related strategy.

Process variables, by their proximity to presage factors (see Figure 1), suggest that deep approaches are more closely related to personal factors. Achieving approaches lie between but slightly closer to deep approaches. Surface approaches are closely related to situational factors. The additional arrows connecting process to performance in the elaborated model indicate the likely ranges and overlap between deep and achieving, and achieving and surface. The deep-achieving outcome is associated with the high structure

end of academic performance, whereas the surface-achieving fits the lower end of academic performance.

Figure 2

Motive and Strategy Approaches to Learning (adapted from Biggs, 1985)

Approach	Motive	Strategy
Deep	Deep motive is intrinsic and task involved: desire to actualize interest and develop competence in particular academic subjects.	Deep strategy is meaningful: well read, generalizes and transfers previous knowledge.
Achieving	Achieving motive is based on competition and ego-enhancement: obtain highest grades, regardless of interest in the material.	Achieving strategy is based on organizing time and working space: behaviour exemplifies 'model student'.
Surface	Surface motive is instrumental: main purpose is to meet requirements minimally: a balance between working too hard and failing.	Surface strategy is mechanical: limit target to bare essentials and reproduce through rote learning.

A distinction is made between strategies and tactics. Tactics are short-term manoeuvres used during learning and are procedures followed as orders regardless of whether or not they are understood. Strategies, however, involve long-term planning prior to learning and are constantly evaluated and renewed.

Since motives and strategies are specifically concerned with learning, Biggs has defined the intervening variables as demonstrating what Novak and Gowin (1985) termed metalearning. Metacognition refers to an individual's awareness of his or her own cognitive resources in relation to a task demand and then the appropriate strategy to plan, monitor, and control those resources. Metalearning, on the other hand, is one of the sub-processes of metacognition that focuses on the processes involved in learning and studying in institutional settings. Metalearning refers to the individual's awareness of his or her motives, and control over his or her strategy selection and deployment as it relates to

learning. Metalearning involves both being aware of the available options and exerting control over those options.

Metalearning is presented as increasing vertically. The surface approach individual is often not aware of motives and strategies and operates from a somewhat gut-reaction approach. The deep approach individuals, on the other hand, operate from an awareness of their own perceptions of motive, strategy, and task structure. Deep approach individuals are able to express why they should or should not be doing a particular activity. Task-specific tactics do not involve any form of metalearning but are performed purely through rote learning.

The five product performance categories (see Figure 1) describe the potential outcomes of the three process groups. The deep approach may result in either a deep outcome or a deep-achieving outcome. The deep outcome student is personally involved in his or her learning, often to the exclusion of acknowledging the institutional requirements, and exhibits a high commitment to learning as well as a complex structure in depth of understanding, thought, and synthesis of material. The deep-achieving outcome student is also personally involved and displays a complex structure, but is able to incorporate the institutional requirements into his or her learning. The achieving approach may be manifest by a deep-achieving (as described above), achieving, or surface achieving outcome. The achieving outcome student combines facts and structure in order to meet the requirements of the marking system and to satisfy his or her ego involvement. The surface-achieving outcome student is the trivial pursuit whiz who has an immense store of facts but lacks the integration of these facts. There is also little involvement in learning. The surface approach is typified by a surface-achieving outcome (as described above) or a surface outcome. The surface outcome student is uninvolved and may even be alienated from learning. Typically he or she lacks both detail and structure and uses a mechanical rote response.

In the formation of his model, Biggs (1985) has developed two measurements for examining motives and strategies; the Learning Process Questionnaire (LPQ) for senior high school and the Study Process Questionnaire (SPQ) for advanced education. Both tasks are student report pencil and paper tasks using a Likert scale to respond to questions probing surface, deep, and achieving motives and strategies.

The Learning Process Questionnaire (LPQ) and the Study Process Questionnaire (SPQ) provide a framework for constructing the learning process from the student's perspective. Profiles can be generated to represent an individual's general orientation to learning. Results from the LPQ or SPQ can be used not only for research purposes but also in making instructional and referral decisions. The most common profiles or styles (see Figure 3) include deep, deep-achieving, achieving, surface, deep-achieving, surface-achieving, surface, and low-achieving (Biggs, 1987; Entwistle, 1981; Schmeck, 1983).

Figure 3

Decisions Related to Learning Profiles (adapted from Biggs, 1987)

Basic Student Profile	Instructional Decision	Referral Decision
1. Deep	Low structure: individualized where possible; direct toward deep-achieving approach to best pursue interests.	Probably not, unless help is needed to promote deep-achieving approach.
2. Deep-Achieving	Low structure: no further action where achievement high. If low, suspect ESL or a mature student.	If appropriate refer to ESL teacher. If a mature student, refer to counsellor to build confidence.
3. Achieving	High structure: emphasize competition and testing, but try to encourage a deep-achieving approach to avoid opportunism	Generally unnecessary.

Basic Student Profile	Instructional Decision	Referral Decision
4. Surface-Achieving	Only in exceptional circumstances is this likely to be congruent with educational goals. Encourage achieving strategies, discourage surface strategies, in interaction with student.	Refer to counsellor; better able to tackle student study strategies directly.
5. Surface	High structure if educationally justifiable. Specify tasks and answer-getting techniques; emphasize organization, details, algorithms. Avoid competition, norm-referencing, use mastery testing.	To counsellor, to train from surface strategies to achieving strategies; improve motivation.
6. Low-achieving	Criterion-referenced /mastery testing and diagnostic teaching; avoid competition, stress. Attribute success to ability, failure to insufficient effort.	To counsellor; a variety of low- and underachieving possibilities here.

Deep patterns are characteristic of academic achievers who pursue their own goals in their own way. These students are interested in following their own interests, relating their own previous experience, generating their own examples, and discovering ideas for themselves. These individuals are self-reliant and if sufficiently interested in a task will work extremely well on individual assignments and projects. The learning approach is closest to their personality and less mutable than other approaches. This may lower their formal school evaluation if the individual's goals are not in keeping with institutional goals. Biggs (1978) has suggested a minimum of intervention for these individuals, only if strategies become maladaptive and non-congruent with their predominant motives or if personal goals become counter-productive to institutional goals.

The deep-achieving patterns are seen in highly adaptive individuals who perform in the top range of academic performance. These individuals are neither out of touch with

institutional goals nor absorbed with the need for high grades at the expense of academic short-cuts. The approach of the individual with deep-achieving patterns should not be changed but should be allowed freedom to pursue complex goals in their own way (Moylan and Biggs, 1983).

Achieving patterns are typical of individuals who are primarily interested in marks and pleasing others. There is deliberate and careful planning to achieve a high academic self concept and to perform well in classroom assignments and tests. The traditional school environment with emphasis on competition, norm-referenced evaluation, organized note-taking, and formal examinations is ideally suited for these individuals with achieving patterns. These students will tend to perform activities such as rote learning extremely well but will not retain the information over time unless re-evaluation is pending. In academic settings these individuals generally perform consistently well and obtain satisfaction from school environments.

Individuals characterized by surface-achieving patterns are uncommon and if present are more often noted in individuals such as armed services personnel who have moved extensively (Biggs, 1987). These individuals are motivated to achieve but adopt a surface approach in an attempt to succeed. This non-congruent approach results in an unlikely chance of success. The aim of intervention is to build these individuals up to an achieving pattern.

Individuals characterized by surface patterns generally have poor academic self-concept and rate their own performance low relative to peers. They are often unsatisfied with their performance and perform poorly on objective criteria. Individuals with surface patterns tend to do well in situations where learning is rote but do not engage in structural complexity and are prone to dropping out of school. They exhibit undue anxiety over examinations, deadlines, and rigid structure and can benefit from assistance to overcome situational stressors. The individual with surface patterns is unlikely to be a competent metalearner who utilizes high level strategies. If the individual's approach is modifiable,

then attempts should be made to improve the operational level of the student. Content and task objectives should be highly structured for the student with the intent of improving the student's academic self-concept.

Individuals with low achieving patterns comprise a heterogeneous group with variations dependent on the balance of deep and surface components. These students generally exhibit low achievement motivation. Although the intelligence of this group can vary, they share a common tendency to be defensive and fearful of the loss of face from failure. This can often result in task avoidance and the setting of low goals typical of underachievers.

Biggs (1987) recommends intervention dependent on the individual's metalearning capability. If the individual's metalearning capacity is high to medium with the student cognitively sophisticated and either well-motivated or open to motivation, then there is a proclivity to a deep approach. High transfer between tasks is possible with motive and strategy congruence. Any form of intervention will be non-directive. On the other hand, if the individual's metalearning capacity is low the individual will tend to exhibit external locus of control, be poorly motivated, and often will have accompanying low abilities. Low metalearning individuals will exhibit surface approaches with low transfer abilities and tactics linked to particular tasks. Intervention thus becomes directive.

Students motivated in a certain way tend to select learning strategies that are congruent with their motives. For example the student who is motivated to obtain the highest grades (achieving approach) will quickly 'size-up' the instructor and make efforts to be the 'model' student, thus reinforcing the instructor's ideas and desires. Similarly, congruent motive and strategy combinations would be more 'effective' than non-congruent ones. The student who requires ego-enhancement and desires the highest grades (achieving motives) but adopts a surface strategy of rote learning the bare essentials is likely to be 'unsuccessful.'

In the discussion of congruence two questions emerge. The first question is whether an individual who demonstrates a particular motive also demonstrates the cognate strategy. The second addresses the extent to which congruent motive and strategy combinations are more 'effective' than non-congruent combinations.

Biggs (1978), in addressing the first question of motive connection to strategy, reported that the correlation between any motive and its cognate strategy was significantly and consistently higher within norming samples than between a motive and a non-congruent strategy. This was later supported by Watkins (1982) and O'Neil and Child (1984). Individuals who rate themselves highly on a particular motive tend consistently to rate themselves highly on the strategy that is associated with that motive.

The second issue as to whether congruent motive and strategy combinations are more effective than non-congruent ones was similarly addressed by Kirby and Biggs (1981) and Biggs (1984). From an investigation into congruent versus non-congruent strategy with performance groups in relation to effective motivational groups, Biggs (1981) reported that there were no non-congruent strategy and performance correlations in the two most effective motivational groups whereas there were eleven congruent ones. Similarly, there were no congruent strategies with performance correlations in the least effective motivational groups but fifteen non-congruent ones. Biggs (1984) concluded, since this is a significant difference, individuals who have inadequate academic self-concept make use of any strategy, regardless of the congruence with poor motivation. Individuals with a good academic self-concept use strategies that are effective only when they are congruent with their motivation.

Biggs (1984) further assumed that the strategy adopted would lead to different levels of quality of learning. Surface approaches were reported to lead to improved factual recall at the expense of structural complexity (Biggs, 1979; Biggs & Collis, 1982). Deep approaches were associated with high complexity, whereas achieving approaches in general were associated with good performance of most kinds. Similarly, achieving motives were

reported to highly correlate with conventional academic performance and achieving strategy to highly correlate with expressed student satisfaction.

These findings are in keeping with the Nicholls (1984) model of two contrasting psychological states of task-involvement and ego-involvement. Task-involvement is the desire to master a task primarily in order to learn or develop ability in that particular task (deep approach). Ego-involvement, on the other hand, refers to a concern with demonstrating high capacity to self or others. Ego-involvement results in a comparison of the individual's effort and performance with that of others. Both Nicholls and Biggs argue that task-involvement (deep approach) with respect to developing life-long learners, is superior to ego-involvement (surface approach). If the individual's primary interest is in performing a task or learning rather than in how others evaluate his or her performance, that individual is likely to continue performing even when no one is evaluating the outcomes (Maehr, 1984).

Research by Thomas and Bain (1982, 1984) has demonstrated that students operate within broad limits of one particular approach, redirecting their approach according to the type of assessment (assignment versus multiple choice exam) and the type of content area. The limits are particularly true for the surface approach individual. Biggs (1979) reported that individuals high on the surface approach reacted very favorably to instruction to focus on facts and details. Individuals high on the deep approach, on the other hand, produced high quality responses regardless of the direction to concentrate on the instructions of the experiment and just reproduce facts and details. The achieving approach individuals interpreted the experiment from an extrinsic perspective and although they obtained a high facts score, they failed to retain these facts to the degree later reproduced by surface approach individuals.

Although individuals are consistent in their approach to different learning situations, this consistency is focused within the framework of the individual's metalearning process. The consistency is influenced by such factors as changing priorities, motivational patterns

shifting, increase in task-relevant knowledge, fatigue, and external pressures resulting in a broad limit of one particular approach.

In summary, Biggs has proposed an elaborated model (see Figure 1) based on his research, to account for student learning, incorporating both a motive and a strategy factor. Two test instruments are available to assess student approaches and a practical instructional and referral plan formulated for basic student profiles. Although continued research will no doubt refine this model, Biggs has provided the researcher and educator with a valuable student-centered framework from which to perceive the learning process.

Biggs' model of learning is in keeping with cognitive approaches that view behavior as mediated by how the individual thinks and perceives reality. The encoding strategy is represented by the individual's motives such as the attainment of a degree, the pursuit of interests, or the attainment of high grades. The self-regulatory systems are represented by the strategies adopted such as reading extra material versus rote learning for an exam. Intervening variables assume that students have a metacognitive awareness of their motives, abilities, and the task demands as well as the ability to control the strategies they deem most appropriate to handle the task within self-perceived constraints. The focus of motivation from the cognitive approach is derived through investigation of the extent to which the individual's perception of events and actions is thought to determine the outcome of behavior.

Proposed Achieving and Underachieving Gifted Profiles

Based on Biggs' (1987) model, achieving students would be expected to approach learning from a deep, deep-achieving, or achieving pattern. In contrast, underachieving gifted students would be expected to approach learning from a surface, surface-achieving, or low-achieving pattern. Students would be expected to utilize the accordant motives and strategies. For example, the student who demonstrates a deep approach to learning would be intrinsically motivated and would rely on strategies that enable the acquisition of

knowledge rather than information recall. The student's outcome or product would be categorized as either successful academic achievement or as unsuccessful academic achievement.

Biggs' (1987) model of student learning can be utilized to explain the interaction of motives and strategies and to account for the differences in product between achieving and underachieving gifted students. Biggs provides some clarity on motivational and strategy factors that relate to achievement. Incorporating the three levels of processing from Biggs (deep, achieving, and surface) a researchable model for explaining achievement and underachievement within the gifted population can be developed (see Figure 4). The focus of this model is on examining the processing differences in underachieving gifted students as a possible explanation for the product differences.

The presage factors presented in this model originate from the frequently quoted taxonomy of giftedness suggested for the United States Office of Education (Education Consolidation Act, 1981) by the Commissioner of Education. Gifted is defined as "possessing demonstrated or potential abilities that give evidence of high performance capability in areas such as intellectual, creative, artistic, leadership capability, or specific academic fields, and who require services or activities not ordinarily provided by the school in order to fully develop such capabilities" (Sec. 582). Although many gifted children perform at a level commensurate with their potential, others do not achieve to expectation.

Gifted students have been separated into achieving and underachieving categories. The two groups possess comparable intellectual abilities but differ on academic success. Some contrasts between achievers and underachievers have been suggested in the areas of self-esteem, self-perception, locus of control, range of interests, organizational skills, comprehension and retention of concepts, and school achievement (Davis & Rimm, 1985, Fine & Pitts, 1980, Rimm, 1985, Whitmore, 1980, 1985). The achieving gifted student is described as having high intelligence, superior comprehension and retention of high-order concepts, able to capitalize on talents and environment, achieving well above grade level in

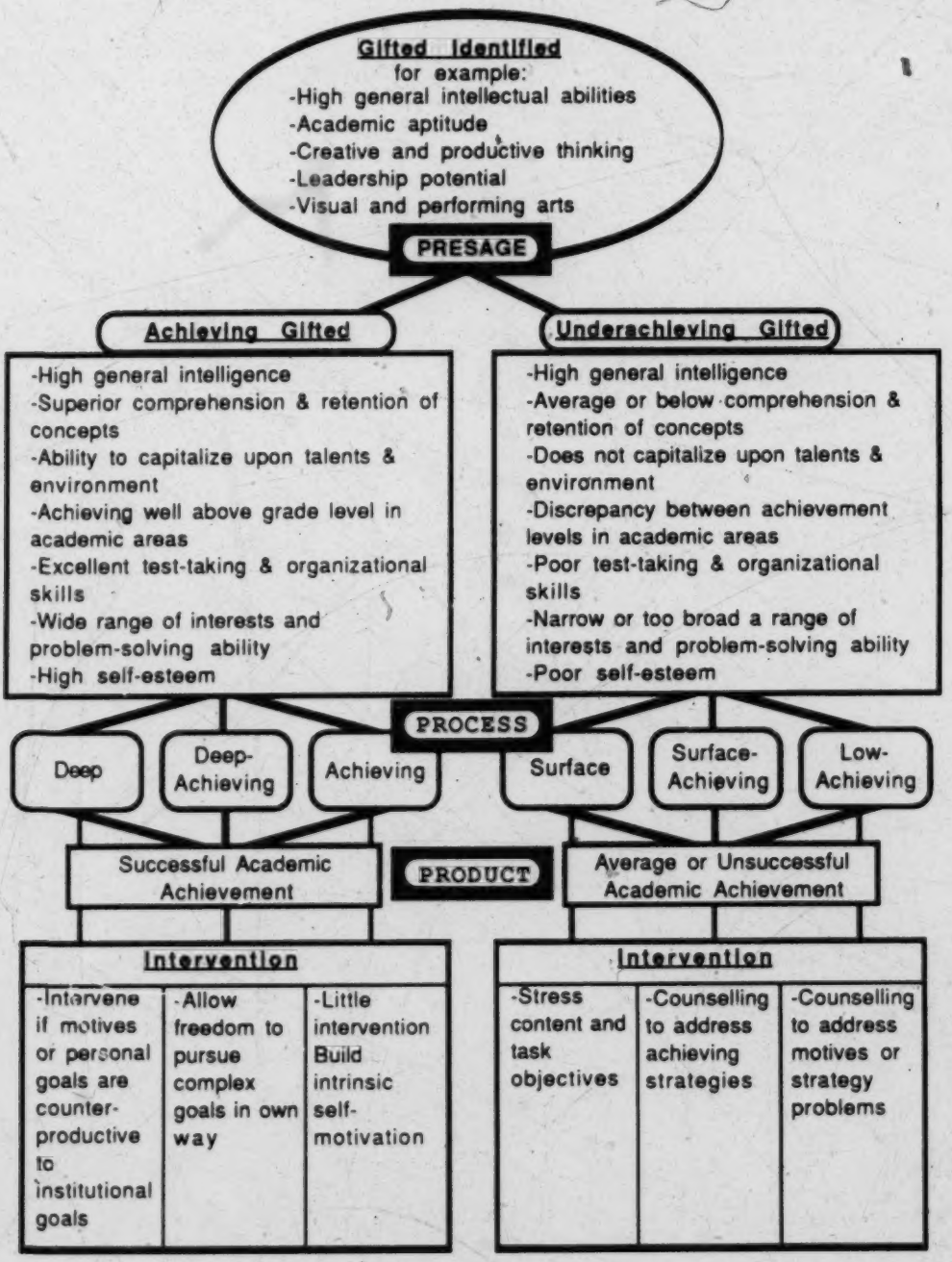
most basic academic skill areas, having excellent test-taking and organizational skills, a wide range of interests, good problem solving ability, and high self-esteem. In contrast, the underachieving gifted student is portrayed as having high intelligence but only average or below average comprehension and retention of high-order concepts, not capitalizing on talents and environment, having a discrepancy between intellectual ability and achievement levels in academic skill areas, having poor test-taking and organizational skills, a narrow range of interests, poor problem solving ability and self-esteem.

Process encompasses the six approaches to learning with product being the academic outcome. The achieving gifted student is characterized by the deep, deep-achieving, and achieving approaches to learning which result in a product of deep, deep-achieving, or achieving outcomes respectively. These outcomes are synonymous with successful academic achievement. In contrast, the surface-achieving, surface, and low-achieving approaches characteristic of underachieving gifted students lead to average or unsuccessful academic achievement as the product or outcome of the process are surface-achieving, surface, or low-achieving outcomes respectively.

Intervention programs, in order to be successful, must be designed to satisfy the requirements of the six different processing groups (deep, deep-achieving, achieving, surface-achieving, surface, and low-achieving). Deep processing students require intervention only if their motives or personal goals become counter-productive to institutional goals. Deep-achieving students ought to be allowed freedom to pursue complex goals in their own way. Achieving students also require little intervention other than to build intrinsic self-motivation. Counselling to develop achieving strategies is the appropriate method of intervention for the student with a surface-achieving process whereas the student with surface processing would benefit from an emphasis on content and task objectives. Students in the low-achieving group would benefit from counselling to address motive or strategy problems.

Figure 4

Schematic Representation of Achieving and Underachieving Gifted Profiles


Gifted Identified
for example:
-High general intellectual abilities
-Academic aptitude
-Creative and productive thinking
-Leadership potential
-Visual and performing arts
PRESAGE
Achieving Gifted
-High general intelligence
-Superior comprehension & retention of concepts
-Ability to capitalize upon talents & environment
-Achieving well above grade level in academic areas
-Excellent test-taking & organizational skills
-Wide range of interests and problem-solving ability
-High self-esteem
Underachieving Gifted
-High general intelligence
-Average or below comprehension & retention of concepts
-Does not capitalize upon talents & environment
-Discrepancy between achievement levels in academic areas
-Poor test-taking & organizational skills
-Narrow or too broad a range of interests and problem-solving ability
-Poor self-esteem
PROCESS
Deep
Deep-Achieving
Achieving
Surface
Surface-Achieving
Low-Achieving
Successful Academic Achievement
PRODUCT
Average or Unsuccessful Academic Achievement
Intervention
-Intervene if motives or personal goals are counter-productive to institutional goals
-Allow freedom to pursue complex goals in own way
-Little intervention Build intrinsic self-motivation
Intervention
-Stress content and task objectives
-Counselling to address achieving strategies
-Counselling to address motives or strategy problems

This model attempts to describe underachievement in the gifted population by evaluating the motives and strategies of students and assessing the type of process which is characteristic of the student. The manner of processing may well differentiate the two groups of achieving and underachieving gifted students and enable educators to make appropriate decisions about the interventions employed to assist students. The limited success of past and current gifted intervention programs might be attributed to inappropriate differentiation of the processes employed by the achieving and underachieving gifted student population.

F. Definitional Problems of Gifted Underachievement and Definition of Terms

First, this section will briefly present the problem of inconsistent definitions that obfuscate research on the underachieving gifted. Then the definition of terms used in this research will be presented.

Definitional Problems of Gifted Underachievement

Definitions of the underachieving gifted vary extensively from extremely general to specific. Gallagher (1979) defines underachieving gifted students as those with either a gap between achievement test scores and intelligence test scores or a gap between academic grades and intelligence test scores. Clark (1979) considers the gifted underachieving child to be "...someone who has shown exceptional performance on a measure of intelligence and who, nevertheless, does not perform as well as expected for students of the same age on school related tasks (p. 279)." Similar general definitions are proposed by Bricklin & Bricklin (1967), Kowitz & Armstrong (1961), Whitmore (1980), and Ziv (1977). Definitions emphasizing the requirement of meeting giftedness as measured by an I.Q. test in the range of 120 or above and evidencing long-standing patterns of academic underachievement are proposed by Fine & Pitts (1980) and Pringle (1970). Newman,

Dember, and Krug, (1973) introduced the need for a child to be achieving significantly below the expected level statistically predicted by I.Q. What constitutes "significantly below" has been further refined by Finney and Dalsem, (1969), Ohlsen and Gazda (1965), Saurenman and Michael (1980), and Shaw and McCuen (1960).

There is general agreement that definitions of gifted underachievement should include a discrepancy between potential and actual academic performance. Confusion emerges as to the nature and magnitude of the discrepancy which should constitute underachievement. Potential can be measured on standardized instruments such as I.Q. tests or non-standardized scales such as teacher or parent ratings. Achievement similarly can be expressed in terms of standardized achievement tests or non-standardized measures such as grade point averages and daily school work production. Underachievement can be described as temporary/situational, for example, a temporary period of disturbance such as divorcing parents or moving to a new school, or as chronic (Whitmore, 1980). Chronic underachieving behavior is defined as patterns that have been established for a long period of time and where there appears to be no indication that the behavior has been created by a temporary situation.

Whitmore (1980) also defines underachievement by the scope of the problem. Underachievement may be in one specific area such as handwriting or athletics or in a subject such as math or English. There may, instead, be broad content area underachievement in such language related subjects as reading, spelling and language arts. There could also be general underachievement where the student is performing below prediction in all academic areas. In this situation the student is usually below average in all subject areas without being outstanding in any part of the curriculum.

Finally underachievement can be defined in terms of the effects on the child. Where the effects are mild to moderate, no evidence of negative outcomes are observable. The student does not appear to be discontented or exhibit disturbances through abnormal emotional adjustment and social behavior. If compensatory or coping behavior that is

destructive or impedes the individual's growth is observed then moderate to severe effects are assumed.

Dowdall and Colangelo (1982) list a sample of fifteen different definitions for underachievement, starting from 1957 and continuing to current times. A hypothetical gifted child with academic difficulties in the article was categorized by one quarter of these definitions as underachieving gifted, excluded from placement in underachieving gifted groupings by another quarter, and not clearly classified by the remaining half. The authors make the point that the extreme variability in definitions makes comparison of research difficult and replication difficult if not impossible.

Definition of Terms

Underachieving gifted, in this research, will be defined in terms of both achievement criteria and gifted criteria. Underachieving gifted students are those students in the Edmonton Catholic School System in grades 6,7,8, and 9

a) with total discrepancy scores at least one and one-half standard deviations below the mean total discrepancy score of the gifted group for each grade as measured by a multivariate technique of multiple regression and

b) who score at least 115 on all of the Verbal, Non-Verbal, and Full scales, or at least 130 on either the Verbal or Non-Verbal scale with a full scale score of 120 or greater, as measured by the Canadian Lorge-Thorndike Intelligence Test.

Achieving gifted are defined as those students in the Edmonton Catholic School System in grades 6,7,8, and 9 who

a) have a total discrepancy score at least one and one-half standard deviations above the mean total discrepancy score of the gifted group for each grade as measured by a multivariate technique of multiple regression and

b) score at least 115 on all of the Verbal, Non-Verbal, and Full scales, or at least 130 on either the Verbal or Non-Verbal scale with a full scale score of 120 or greater, as measured by the Canadian Lorge-Thorndike Intelligence Test.

Motivational Factors are defined as those affective characteristics in the profile of the underachieving gifted student that would be the focus of counselling intervention. The motivational approach is limited to those factors measured by Coopersmith's Self-Esteem Inventory, Harter's Scale of Perceived Competence, Crandall's Intellectual Achievement Questionnaire, and the Scale of Intrinsic Versus Extrinsic Orientation in the Classroom.

Learning Strategies are defined as those processing characteristics in the profile of the underachieving gifted student that would be the focus of cognitive strategies as an intervention program. The learning strategies factors are limited to those approaches that are measured by Cornell's Critical Thinking Test Level X, the Paris Reading Awareness Questionnaire, the Error Detection Task, the Learning Process Questionnaire (modified by Biggs & Mulcahy), and the Vygotsky Blocks.

G. Limitations

The terms of giftedness, achievement, underachievement, motivation, and strategy are hypothetical constructs. The elaboration and definition of these terms is beyond the scope of this research. For pragmatic purposes, this research has been guided by the specific operational definitions of these hypothetical constructs presented above. Operational definitions limit the scope of the study while providing a platform from which to research a specific topic.

Giftedness has been defined on the basis of a group administered I.Q. test (Lorge-Thorndike). Achievement and underachievement have been defined through the calculation of (expected versus actual) deviation scores obtained from a multiple regression equation predicting Canadian Test of Basic Skills scores. Of the myriad possibilities related to

motivation, only the affect variables of self-esteem, self-perception, locus of control, and intrinsic versus extrinsic orientation in the classroom were examined. Strategies were similarly limited by critical thinking skills (Ennis, 1961), reading awareness, error detection task, Vygotsky blocks, and students' approaches to learning.

The tests administered in this study are generally reported to have acceptable reliability, predictive, concurrent, discriminant, and/or factorial validity for the measurement of motivational and strategy factors through such measures as self-reporting scales. The construct validity of these tests, the extent to which they measure a hypothetical construct, is not reported. Thus, results must be interpreted with allowance for the limitations of the hypothetical constructs and the tests used to measure them.

CHAPTER III

METHODS AND DESIGN

A. Outline of Method

This study utilized a cross-sectional, longitudinal, qualitative and quantitative design involving students in the 6th, 7th, 8th, and 9th grades in the Edmonton Catholic School System over a two-year period. Students were selected and grouped either as achieving gifted or underachieving gifted. Each group was administered a test battery to measure motivational variables and strategy variables. In the first year motivational variables were measured by Coopersmith's Self-Esteem Inventory, the Harter Scale of Perceived Competence, and Crandall's Intellectual Achievement Questionnaire. Strategy variables were measured by Cornell's Critical Thinking Test Level X, the Paris Reading Awareness Questionnaire, and the Error Detection Task.

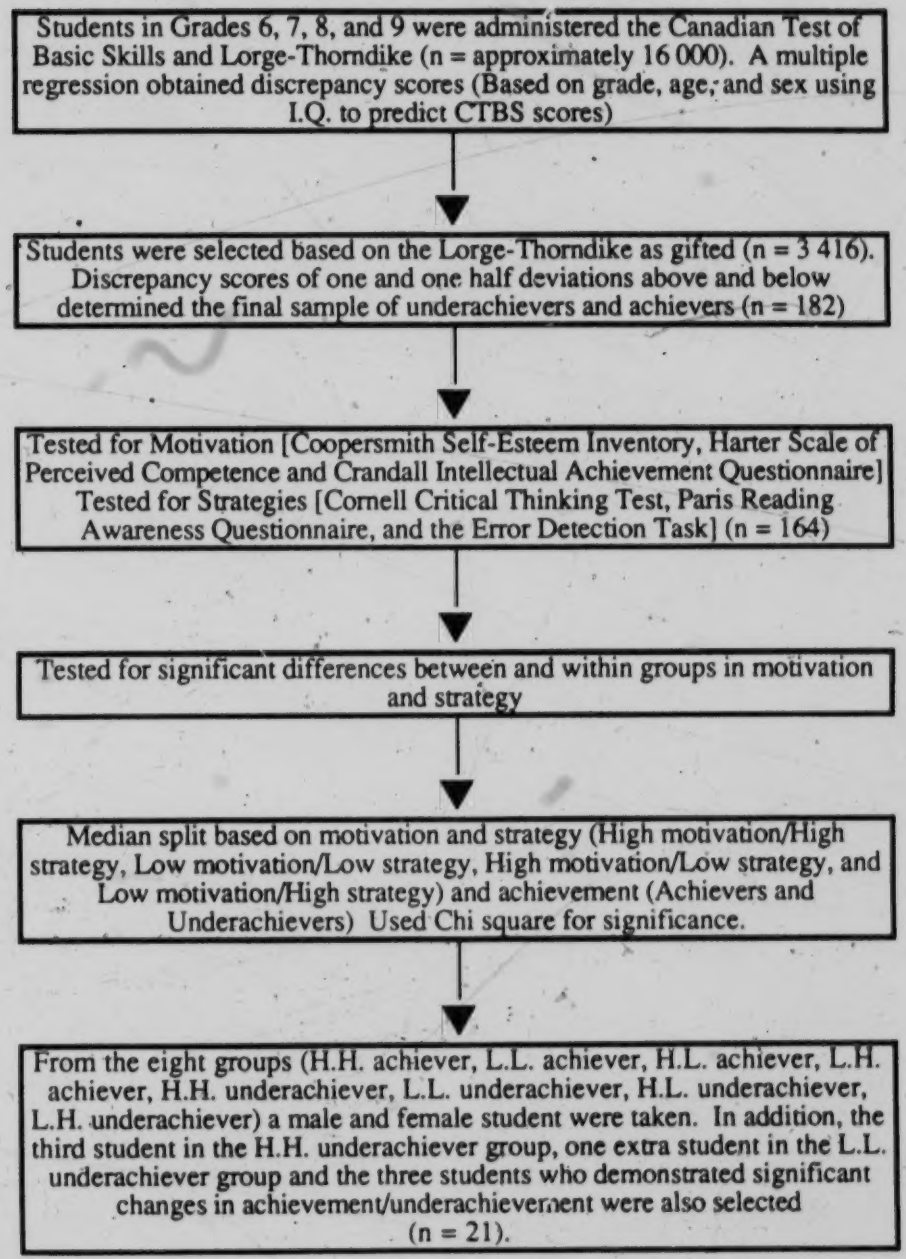
From motivational and strategy variables that statistically differentiated the achieving and underachieving group in the first year, a median split was conducted grouping students into eight patterns of motivation and strategy. The eight groupings included both the achieving and the underachieving students who were either high in motives and high in strategies, low in motives and low in strategies, high in motives and low in strategies, and low in motives and high in strategies.

The second year involved selecting two students, a male and a female from the median split groups (in two groups three students were selected), as well as three students who demonstrated extreme changes in achievement and underachievement over the two year testing period. These twenty-one students formed the representative sample chosen to participate in the second year of research into profiles of the underachieving gifted. The second year students were administered a repeat of the tests from the previous year. They also completed the Vygotsky Blocks, Biggs' Learning Process Questionnaire (modified for Junior High by Biggs and Mulcahy), A Scale of Intrinsic Versus Extrinsic Orientation in the Classroom, and a semi-structured interview. Analysis of the second year data was

through a triangulation approach and through the reporting of case study vignettes. Figure 5 is a summary of the procedure used in this research over the past two years.

Figure 5

Outline of Steps in Method


Students in Grades 6, 7, 8, and 9 were administered the Canadian Test of Basic Skills and Lorge-Thorndike (n = approximately 16 000). A multiple regression obtained discrepancy scores (Based on grade, age, and sex using I.Q. to predict CTBS scores)
Students were selected based on the Lorge-Thorndike as gifted (n = 3 416). Discrepancy scores of one and one half deviations above and below determined the final sample of underachievers and achievers (n = 182)
Tested for Motivation [Coopersmith Self-Esteem Inventory, Harter Scale of Perceived Competence and Crandall Intellectual Achievement Questionnaire] Tested for Strategies [Cornell Critical Thinking Test, Paris Reading Awareness Questionnaire, and the Error Detection Task] (n = 164)
Tested for significant differences between and within groups in motivation and strategy
Median split based on motivation and strategy (High motivation/High strategy, Low motivation/Low strategy, High motivation/Low strategy, and Low motivation/High strategy) and achievement (Achievers and Underachievers) Used Chi square for significance.
From the eight groups (H.H. achiever, L.L. achiever, H.L. achiever, L.H. achiever, H.H. underachiever, L.L. underachiever, H.L. underachiever, L.H. underachiever) a male and female student were taken. In addition, the third student in the H.H. underachiever group, one extra student in the L.L. underachiever group and the three students who demonstrated significant changes in achievement/underachievement were also selected (n = 21).

Repeat testing for motivation (Coopersmith Self-Esteem Inventory, Harter Scale of Perceived Competence and Crandall Intellectual Achievement Questionnaire) and strategies (Cornell Critical Thinking Test, Paris Reading Awareness Questionnaire, and Mulcahy Error Detection Task). Also administered were the Vygotsky Blocks, Learning Process Questionnaire (modified by Biggs & Mulcahy), Scale of Intrinsic Versus Extrinsic Orientation in the Classroom, and a semi-structured interview.

B. Subjects

The subjects for this study were identified as gifted achievers or underachievers on the basis of the Canadian Test of Basic Skills and the Canadian Lorge-Thorndike Intelligence Test which had been administered to all students in the Edmonton Catholic School System at the end of the 1985-1986 and 1986-1987 school years. All students in grade six, seven, eight, and nine with a Full scale I.Q. of 115 and above (one standard deviation above the mean) as measured by the Canadian Lorge-Thorndike Intelligence Test were initially selected. Further screening for appropriate subjects was then effected using two sets of criteria for scores on Verbal and Non-Verbal portions of the Lorge-Thorndike Intelligence Tests. The first set of criteria included all students with a Verbal, Non-Verbal, and Full scale I.Q. of at least 115. The second set of criteria included students with a score of at least 130 on either the Verbal or Non-Verbal portion of the Lorge-Thorndike with a Full scale score of 120 or greater. The purpose of these criteria was to ensure that subjects would be either above the norm on both the Verbal and Non-Verbal portions or be exceptionally high in one area of the Lorge-Thorndike Intelligence Tests.

Further screening utilizing the Canadian Test of Basic Skills (C.T.B.S.) to determine a measure of achievement was then performed. A multiple regression procedure incorporating Full Scale I.Q., age, and gender factors to predict expected achievement was calculated on all students, grades four through nine, in the school system. The strength of the relationship between each predictor was obtained by using all the students in the system

in a particular grade. Each predictor variable was then assigned a weighting. The weights were then put into a regression formula for each pupil to obtain an expected achievement level for that student. Expected achievement was subtracted from actual achievement to obtain a discrepancy score. Subjects for the study were chosen on the basis of intellectual and achievement parameters and the sample selected for this study was comprised of all students in grades six, seven, eight, and nine who met the criteria for giftedness and were also one and one-half standard deviations above (achievers) or below (underachievers) the mean of the gifted group with respect to the discrepancy score.

Subjects were selected on the basis of testing administered prior to this research; therefore, information on the presence of intervening variables such as recent emotional disturbances, language difficulty (ESL), and extended illness which may have resulted in temporary discrepant performance during the testing was sought informally from both subjects and school staff. Where such a situation existed the student was disqualified as a subject for this study.

Following analysis of the data from the first year, the significant dependent variables were selected and a median split was conducted that resulted in the formation of eight groups based on motivation and strategy. A small number of students (n = 21) to represent these groups were selected to participate in a further investigation into the profile of the underachieving gifted through a triangulation analysis using both quantitative and qualitative data. The students represented a male and a female student from each median split group who demonstrated the most distinct example (n = 18). All three students were selected from one group. During the data collection a member of another other group mentioned a recent absence from school due to illness. As a result a third representative individual was also selected from this median split group. Finally, three students who demonstrated a significant change in their performance over the two years were also selected. Thus the final sample for the second year was comprised of twenty-one students.

Defining Achievement and Underachievement with the Prediction Model

The multivariate technique of multiple regression analysis by grade, calculated prior to this research for all students in the Edmonton Catholic School System, yielded the discrepancy scores. The correlation between criterion variables was based on scores from each of the four sub-tests of the Canadian Test of Basic Skills (C.T.B.S.) and the predictor variables of the Lorge-Thorndike Full Scale I.Q., gender, and chronological age measured in years. Each of the four sub-tests (vocabulary, reading comprehension, math concepts, and math problem solving) of the Canadian Test of Basic Skills for grades six, seven, eight, and nine were used to obtain coefficients of determination (R^2) and prediction equations. The prediction equation, expressed as: $Y = \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + C$ with Y being the score predicted from X_1, X_2, and X_3 (X_1, individual student's I.Q.; X_2 gender; X_3 chronological age), β being the separate beta weights calculated for each predictor variable (based on total number of students) and C being a constant, was used to calculate the expected score of each student on each of the four sub-tests. Each student obtained four Y predicted scores, one for each of vocabulary, reading comprehension, math concepts, and math problem solving.

Achievement, as measured by the Canadian Test of Basic Skills, was the criterion variable which was assumed to be predicted by students' I.Q., gender, and age. The same variance in the criterion variable was considered unlikely to be repeated since the correlation between predictor variables was assumed to be low. There was an assumption made that a high correlation existed between the predictor variables and the criterion variable.

The SPSS-X statistical package was used to calculate the correlations between the predictor variables and the criterion variable. The magnitude of the relationship between the criterion variable and predictor variables was measured by computing a multiple correlation coefficient (R) using the best predictor for first entry into the multiple regression equation.

Tests to determine whether the obtained value of R was significantly different than zero or to determine whether the R^2 increment was statistically significant were not conducted. The expected scores on the respective sub-tests of the C.T.B.S. were obtained by including all predictor variables in the equation, regardless of significance.

The best possible prediction of the student's score on the criterion variable was obtained by multiplying each student's score on the predictor variables by the appropriate regression weights and then summing. Discrepancy scores for each individual were obtained by subtracting the predicted or expected scores on vocabulary, reading comprehension, math concepts, and math problems from the actual scores on each of the sub-tests.

The discrepancy scores for each of the four sub-tests were summed to arrive at a total discrepancy score. The final selection of gifted achievers and underachievers was based on the calculation of the mean and standard deviation of the total discrepancy score of all the students previously selected on the basis of meeting the criteria of giftedness. Those students lying at least one and one-half standard deviations from the mean were selected to represent the gifted achievers and underachievers. Table 1 outlines the results of the calculations of the means and standard deviations of the total discrepancy scores of all students (n = 3416) meeting the criteria of giftedness.

Table 1

Means and Standard Deviations Across Grades for Total Discrepancy For All Gifted Students
(n = 3416)

	Grade Six		Grade Seven		Grade Eight		Grade Nine	
	Mean	S. D.	Mean	S. D.	Mean	S. D.	Mean	S. D.
Total Discrepancy	-.582	2.116	-.793	2.508	.185	2.955	-.394	2.755

The achieving gifted group was comprised of all of the subjects having an IQ within the operationally defined gifted range and a positive discrepancy score of one and one-half standard deviations, or greater, from the gifted subjects' mean. The underachieving gifted

group consisted of all subjects having an IQ within the operationally defined gifted range and a negative discrepancy score of one and one-half standard deviations, or greater, from the gifted subjects' mean.

There were 182 students eligible for testing according to the criteria for selection of subjects based on I.Q., achievement discrepancy, and grade. Three subjects were eliminated; one on the basis of English as a second language, one due to a change of residence, and one at the request of parents. No subjects were perceived as having recent emotional disturbances or extended illness. Permission was granted by principals for testing in forty-two of the forty-four schools representing all major districts of Edmonton where the eligible students attended. The fifteen subjects eliminated in the two schools were distributed over grades six through nine, and other schools in the geographical areas of refusal were tested. Therefore, subject biasing due to mortality is not felt to have influenced subject selection.

There were 164 subjects tested. Of these, 87 were underachievers and 77 were achievers. By gender, there were 91 males and 73 females. Gender differences amongst the 45 male underachievers, 46 male achievers, 42 female underachievers and 31 female achievers were not found to be significant using χ^2 for two by two tables with χ^2 obt. = 1.0497 ($\alpha > .05$, df. = 1). The number of subjects was relatively uniform for each grade level (see Table 2).

Table 2

Breakdown of Subjects by Grade, Achievement, and Gender

	Grade Six		Grade Seven		Grade Eight		Grade Nine		Totals	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
Underachiever:	9	14	13	13	7	12	16	3	45	42
Achiever:	10	6	13	7	13	10	10	8	46	31
Totals:	39		46		42		37		164	

There were 23, 26, 19, and 19 underachievers respectively in grades six, seven, eight, and nine. There were 16, 20, 23, and 18 achievers respectively in grades six, seven, eight, and nine.

An one-way analysis of variance (ANOVA) was utilized in the analysis for significant differences in I.Q., as measured by the Canadian Lorge-Thorndike Intelligence Test, between the underachieving and achieving gifted subjects at each grade level. It was important to establish homogeneity between underachieving and achieving groups with respect to intelligence to avoid the possibility of an observed difference on the dependent variable being due to between group differences on intellectual abilities.

In order to distinguish between the underachieving and the achieving gifted subjects, significant differences were anticipated between expected achievement and actual achievement as measured by the Canadian Test of Basic Skills. An one-way analysis of variance was used to test this expectation at each grade level. For the purposes of this study, dissimilarity on achievement criteria and similarity on intelligence scores were desired.

Analysis for Determining the Equivalence of Groups Based on the Canadian Lorge-Thorndike

To assess whether the condition of homogeneity of intelligence was met, an one-way analysis of variance was conducted to determine the between groups and within groups differences for each grade on the individual sub-tests of the Lorge-Thorndike Intelligence Test.

Full Scale: One-way ANOVAs revealed no significant differences between the underachieving and achieving gifted students on the Full scale I. Q. of the Lorge-Thorndike for grade six [$F(1,37) = .993$, $p = .3405$], grade seven [$F(1,44) = 2.034$, $p = .1609$], grade eight [$F(1,40) = .002$, $p = .9615$], and grade nine [$F(1,35) = .976$, $p = .3299$]. The

mean and standard deviation were similar across grades for both underachievers and achievers (see Table 3).

Table 3

Lorge-Thorndike Full Scale Means, Standard Deviations, and Standard Errors Across Grades

	Grade Six	Grade Seven	Grade Eight	Grade Nine
Underachiever Means:	129.913	130.077	128.526	129.632
Std. Dev:	5.783	6.517	5.327	8.207
Std. Error:	1.206	1.278	1.222	1.883
Achiever Means:	128.375	127.650	128.609	127.333
Std. Dev:	3.160	.998	5.582	5.626
Std. Error:	.790	2.267	1.164	1.326

Verbal Scale: One-way ANOVAs revealed a significant difference between the underachieving and achieving gifted students on the Verbal scale I. Q. of the Lorge-Thorndike for grade six [$F(1,37) = 8.534$, $p = .0059$]. No significant differences between groups on the Verbal scale were noted for grade seven [$F(1,44) = 1.886$, $p = .1766$], grade eight [$F(1,40) = .029$, $p = .8652$], and grade nine [$F(1,35) = 2.955$, $p = .0945$]. The only discrepancy found across the four grades for the intelligence comparisons was in the grade six group; therefore, possible biasing in subject selection is expected to be minimal. Nevertheless, significant results at the grade six level may require interpretation because of the verbal differences. There was greater fluctuation in the mean and standard deviation for both underachievers and achievers across grades than in the Full scale and Non-Verbal results (see Table 4).

Table 4

Lorge-Thorndike Verbal Means, Standard Deviations, and Standard Errors Across Grades

		Grade Six	Grade Seven	Grade Eight	Grade Nine
Underachiever	Means:	128.261	128.615	125.579	125.158
	Std. Dev:	7.599	8.290	7.081	9.518
	Std. Error:	1.585	1.626	1.625	2.183
Achiever	Means:	122.125	125.650	125.957	120.722
	Std. Dev:	4.241	5.622	7.170	5.550
	Std. Error:	1.060	1.257	1.495	1.308

Non-Verbal Scale: No significant differences were noted between the underachieving and achieving gifted students on the Non-Verbal scale I. Q. of the Lorge-Thorndike for grade six [$F(1,37) = 2.067$, $p = .1589$], grade seven [$F(1,44) = .64$, $p = .4279$], grade eight [$F(1,40) = .004$, $p = .948$], and grade nine [$F(1, 35) = .003$, $p = .9568$] when one-way ANOVAs were employed. The mean and standard deviation for both underachievers and achievers across grades were similar (see Table 5).

Table 5

Non-Verbal Means, Standard Deviations, and Standard Errors Across Grades

		Grade Six	Grade Seven	Grade Eight	Grade Nine
Underachiever	Means:	131.130	131.077	130.842	133.632
	Std. Dev:	6.427	8.428	11.349	11.122
	Std. Error:	1.340	1.653	2.604	2.551
Achiever	Means:	134.000	129.150	130.652	133.444
	Std. Dev:	5.669	7.638	7.290	9.618
	Std. Error:	1.417	1.708	1.520	2.267

Analysis for Determining Differences Between Groups Based on the Discrepancy Scores

It was expected that there would be significant differences between underachievers and achievers on total discrepancy scores since the subjects were selected on the basis of discrepancy scores that were one and one-half standard deviations above (achievers) or

below (underachievers) the mean of the gifted group. Results of the calculation of individual means and standard deviations of the four grade levels indicate there is a difference and furthermore, the one-way ANOVAs reveal significant differences between underachieving and achieving gifted students on the total discrepancy score for grade six [$F(1,37) = 269.462$, $p = .0001$] grade seven [$F(1,44) = 234.735$, $p = .0001$], grade eight [$F(1,40) = 527.843$, $p = .0001$], and grade nine [$F(1,35) = 77.024$, $p = .0001$]. Further details of the analysis of subject sample selection are available from McClelland (1987).

Summary

The analysis of achieving and underachieving students reveals that intelligence, as measured by the Lorge-Thorndike, does not differ significantly between the two groups or across grades except for verbal scores at the grade six level, and that there is a significant difference in total discrepancy scores between underachievers and achievers. The sample selected appears to meet the necessary criteria of similarity in intellectual potential and dissimilarity in achievement.

C. Screening Instruments

The basis for the initial selection of students was the Canadian Lorge-Thorndike Test for aptitude and the Canadian Test of Basic Skills for achievement which were administered to all students at the end of the 1985-1986 school year by the individual classroom teachers in the Edmonton Catholic School System. Results are expected to be relatively consistent within and between classrooms as these tests are simple to administer and have a standard procedure for scoring.

Canadian Lorge-Thorndike Intelligence Test

The Canadian Lorge-Thorndike Intelligence Test (Lorge, Thorndike, Hagen, & Wright, 1967; Thorndike, 1963; Tittle, 1972) has been widely used in schools as a

measure of scholastic aptitude and verbal ability. There are two batteries, the Verbal and the Non-Verbal. The Verbal battery is comprised of four separate sub-tests: vocabulary, arithmetical reasoning, verbal classification and sentence completion. The Non-Verbal battery has three sub-tests which examine figure classification, number series and figure analogies. Both batteries are highly correlated and have good odd-even reliability (see Table 6). Both the Verbal and Non-Verbal portions of the Lorge-Thorndike are correlated with achievement tests (r = .58 to .87) and school grades (r = .52 to .76).

Table 6

Odd-Even Reliability of the Lorge-Thorndike Intelligence Test

		Verbal Battery			Non-Verbal Battery			
Grade	N	Mean	S.D.	r_{11}	Mean	S. D.	r_{11}	Correlation
5	550	49.76	13.85	.915	41.38	12.70	.920	.659
6	568	49.79	13.12	.911	39.65	13.44	.911	.612
7	598	46.78	11.29	.872	40.64	12.07	.908	.605
8	559	45.33	10.32	.830	37.81	10.76	.897	.558
9	575	51.52	11.42	.867	42.00	10.43	.894	.613

(Thorndike, 1963, p. 29)

There is a limited validity when employing the Lorge-Thorndike to compare aptitude with level of achievement. The type of ability measured on the Lorge-Thorndike is limited, with the authors claiming that both Verbal and Non-Verbal batteries are "avowedly measures of abstract intelligence - expressed in verbal symbols in the one case and in pictorial, diagrammatic, and numerical symbols in the other." (Thorndike, 1963, p. 14) There is relatively little information on validity studies of the Lorge-Thorndike, most reporting being on reliability. In the Preliminary Technical Summary, using Kuder-Richardson (20) reliabilities, it was reported that for the Verbal battery the KR 20s are in the Mid.-.90s at grade levels 3-12 and for the Non-Verbal battery they are in the .92 to .94 range. Stability coefficients are .93 in grades 6 through 9 on the Verbal battery and .89 in

grade 7 on the Non-Verbal battery over a six-month period. The reliability values appear to be satisfactory for a group administered intelligence test.

Canadian Test of Basic Skills

Generalized educational achievement in the development of basic skills in the areas of vocabulary, reading, language, work-study knowledge, and mathematics are purportedly measured by the Canadian Test of Basic Skills (King, Hieronymus, Lindquist, Hoover, Scannel, 1982). The administrator's manual has moderate to high levels of internal consistency reported with reliability coefficient scores which range from .64 to .93. These are acceptable values for this type of achievement test. Validity results, showing moderate to high correlations of .53 to .76 between Canadian Test of Basic Skills (CTBS) sub-test scores and year-end course grades for students in the ninth grade, are available for the Cardston, Alberta, school district but the validity of the tests for particular groups and purposes are left to be determined by informed judgement. The CTBS was derived from the Iowa Test of Basic Skills (ITBS), a test with a sound reputation in American schools. The ITBS was altered to reflect norms based on a national Canadian sample and to utilize Canadian content. The Canadian Test of Basic Skills is considered to have value for the prediction of school academic performance (King, Hieronymus, Lindquist, Hoover, Scannel, 1982).

D. Assessment Instruments

Measurement of the dependent variables for the first year was obtained through the use of Coopersmith's Self-Esteem Inventory, the Harter Scale of Perceived Competence, and Crandall's Intellectual Achievement Responsibility Questionnaire for motivational variables; Cornell's Critical Thinking Test Level X, the Paris Reading Awareness Questionnaire, and the Error Detection Task for strategy variables. In the second year the

Scale of Intrinsic Versus Extrinsic Orientation in the Classroom, the Vygotsky Blocks, the Learning Process Questionnaire, and a semi-structured interview were also employed.

Motivational Measurement

The measurement of motivation presented some difficulties. Measurement instruments used to examine motivational factors primarily focused on affect variables (attitude and perception of school) and control variables. The use of correlates of motivation such as the affect variables self-esteem and perceived competence formed the basis of analysis of antecedent conditions in some achievement motivation research (Parsons, Midgely, & Adler, in press; Stipek, 1984). The Coopersmith Self-Esteem Inventory and the Harter Scale of Perceived Competence tested students affect which relates more to the need and achievement motivational theories. The Crandall Intellectual Achievement Responsibility Questionnaire examined motivation from a cognitive attribution theory approach.

Coopersmith's Self-Esteem Inventory examined the value students placed on the academic environment and provided useful comparisons on social and family dimensions. Harter's Perceived Competence Scale provided a measure of the students' self-perception on areas such as the school, physical abilities, social ease, and cognitive abilities. Internal and external locus of control was measured by Crandall's Intellectual Achievement Responsibility Questionnaire to determine the extent students perceived themselves to be in control of their academic environment. These test instruments formed the first year battery on motivation and the results influenced both the selection of the second year instruments and the grouping of students into motivational and strategy variables. All instruments from the first year were repeated to determine motivational consistency over the two years. The instruments were reported to have a reliability and validity well within acceptable limits (Baarstad, 1978; Crandall, Katkovsky, & Crandall, 1965; Donaldson, 1974; Harter, 1982; Kanoy, Johnson, & Kanoy, 1980; Spatz & Johnson, 1973). Also a comprehensive report

providing Alberta norms, reliability, and validity for Coopersmith's Self-Esteem Inventory, the Harter's Perceived Competence Scale, and Crandall's Intellectual Achievement Responsibility Questionnaire is currently being analyzed (Mulcahy, Norman, Peat, Clifford, Andrews, Cho, Marfo, & Darko-Yeboah, in press).

Included in the second year was the Scale of Intrinsic Versus Extrinsic Orientation in the Classroom. This test was added to the battery to determine if motivational patterns observed in the first year could be supported through a similar instrument reported to measure academic motivation. All instruments measuring motivational factors, from the first and second year, were group administered tests. Together these instruments provided a broad spectrum of motivational variables that were expected to be evident in academic achievement.

Coopersmith's Self-Esteem Inventory (administered both years)

The Coopersmith Self-Esteem Inventory was administered to assess attitudes toward self in social, academic, family, and personal areas of experience. Donaldson (1974) examined the predictive validity of the Coopersmith Self-Esteem Inventory by correlating the sub-scale scores of the test through regression analysis. The General Self sub-scale with a N of 643 had a multiple correlation of .53. Spatz and Johnson (1973) using a Kuder-Richardson reliability estimate (KR 20) with an N of 600 and randomly selecting students in grades 5, 9, and 12 found at all three levels coefficients in excess of .80. It is thus considered to be a reliable instrument.

Coopersmith's Self-Esteem Inventory was selected to provide an understanding of the student's value placed on school, family, social, and personal areas of experience. Differences in responses between underachieving and achieving gifted students were expected in these areas. The instrument reports acceptable reliability and validity and is suitable for the range of grade levels selected for this research. The instrument also has the

benefit of being a group administered test. For these reasons, Coopersmith's Self-Esteem Inventory formed part of the test battery.

Harter's Perceived Competence Scale (administered both years)

Harter's Perceived Competence Scale (Harter, 1982) examines the student's self-perceptions on four sub-scales: Cognitive, Social, Physical, and General. The cognitive sub-scale examines students' views of their academic abilities. Views of the students' social skills and popularity are measured on the social sub-scale. The physical sub-scale measures the students' views of their physical abilities related to activities such as sports. The students' views of self as a measure of general self-esteem is assessed through the general sub-scale. This test has a relatively high reliability and validity.

Harter (1982) has reported reliability and validity from studies involving samples of students from Colorado, California, Connecticut, and New York averaging approximately 450 students in each study. Students in the samples were obtained from the upper elementary grades. Internal consistency was obtained through combining the Connecticut and California sample with reported alpha coefficients of .76, .78, .83, and .73 for the cognitive, social, physical, and general sub-scales. Reliabilities ranged from .75 to .83, .75 to .84, .77 to .86, and .73 to .82 for the four respective sub-scales. Test-retest reliability on 208 Colorado pupils after three months, and a sample of 810 pupils from New York after nine months was reported to be .78, .80, .87, and .70 for Colorado and .78, .75, .80, and .69 for New York for the respective subscales.

Factorial validity was conducted on a New York sample of 810 students reporting the average loadings of items on the designated factors of cognitive, social, physical, and general sub-scales to be .67, .61, .64, and .50 respectively. Convergent validity with pupil and teacher ratings in the cognitive domain demonstrated a developmental trend. Correlations for third, fourth, fifth, sixth, seventh, eighth, and ninth grades were reported to be .28, .32, .50, .55, .31, .66, and .73 respectively. Baarstad (1978) in a study with

learning disabled children reported discriminant validity in the cognitive area when learning disabled students were compared to regular children $t(38) = 2.9$, $p < .005$.

The question format utilizes a "structured alternative format" in which the student is presented with two contrasting individuals. The student must first decide which student is most like him or her and then must answer if this individual is sort of true or really true for him or her. Each item is then scored on an ordinal scale from one to four. This task appears to be developmentally appropriate for students and possesses ecological validity.

The Harter Perceived Competence Scale was selected to provide a measure of the students' self-perception on areas such as the school, physical abilities, social ease, and cognitive abilities. Since self-esteem and self-perception would be expected to correlate highly with each other, this instrument was expected to support results obtained from Coopersmith's Self-Esteem Inventory. Differences in responses between underachieving and achieving gifted students were expected. The instrument reports acceptable reliability and validity and is suitable for the range of grade levels selected for this research. The instrument also has the benefit of being a group administered test. For these reasons, Harter's Perceived Competence Scale formed part of the test battery.

Crandall's Intellectual Achievement Responsibility Questionnaire

(administered both years)

The Intellectual Achievement Responsibility Questionnaire (IAR) was developed by Crandall, Katkovsky, and Crandall (1965) to meet the need for an assessment of internal/external locus of control. Three orientations guided the development of the assessment technique. The test was to be primarily a measure of locus of control as it relates to achievement across subject areas. It was to have a focus on those perceived to be significant others such as teachers, peers, and parents as a source of external control and, therefore, suited for use with school-aged children. Finally, it was to have separate measures for internal control to provide scores for a subjects' response to situations

involving success as well as failure. Thus, the IAR is generalizable across academic areas, examines specific agents of external control, and investigates two types of internal control.

The IAR reports only one score for external locus of control which is based on the significant others in a student's environment rather than on a variety of sources and agents such as luck, fate, and impersonal social forces. Those situations whose outcomes are perceived to be positive when assuming credit and those whose outcomes are perceived to be negative when assuming blame are the two situations which are assumed to be encompassed by internal locus of control (the acceptance of responsibility). Since the dynamics involved in accepting a successful outcome versus an unsuccessful outcome may vary from individual to individual, the IAR contains two sub-scales of equal numbers of questions, one pertaining to attributions of responsibility for success experiences (I^+) and the other to attributions of responsibility for failure experiences (I^-). A total internal score is calculated by adding the internal attributions for success and failure which are obtained from the subject's responses to the 34 items on the test.

Information on the test-retest reliability of the IAR was reported by Wolk and Eliot (1974) to be .55 for internal positive, .60 for internal negative and .62 for total internal scores after a three-week interval. Similarly, Crandall, Katkovsky, and Crandall (1965) reported that the test-retest reliability was .66 for internal positive, .74 for internal negative and .69 for total internal scores on the IAR after a two-month interval. These correlations were all significant at the $p < .001$ level. Seventy ninth-grade subjects were similarly tested and revealed reliability coefficients of .47 for internal positive, .69 for internal negative, and .65 for total internal scores which were also significant at the $p < .001$ level. Crandall, Katkovsky, and Crandall (1965), testing a sample of 923 elementary and high-school students from five different schools representing children from diverse kinds of communities, reported split-half reliabilities for the two sub-scales of the IAR from a random sample of 130 of the 923 elementary subjects to be .54 for internal positive and .57

for internal negative scores. A similar random sample with older children revealed correlations of .60 for both internal positive and internal negative scores.

The IAR has acceptable test-retest and split-half reliability for a locus of control instrument. According to Crandall, Katkovsky, and Crandall, (1965) the validity of the IAR is also good and in keeping with predictions from personality theory and common observations. The IAR scores are positively and significantly related (.34 to .53) to reading, language, and math sub-scores and total achievement-test scores as well as report cards in the elementary grades. The IAR has been used extensively in research related to achievement (Clifford & Cleary, 1972; Delisle & Renzulli, 1982), giftedness (Kanoy, Johnson, & Kanoy, 1980), and academic performance (Crandall & Lacey, 1972; Messer, 1972; Powell, 1971). As a measure of locus of control, the IAR appears to have good reliability, reasonable validity, and is appropriate for the sample and construct examined.

To sum up, Crandall's Intellectual Achievement Responsibility Questionnaire (IAR) is considered to be a suitable test to assess internal and external locus of control and has been widely accepted and used in educational research. When examining a child's beliefs regarding responsibility for outcomes in academic achievement situations the IAR limits the source of external control to persons whom the individual is most likely to contact, and eliminates factors such as personality and self-determination.

Crandall's Intellectual Achievement Responsibility Questionnaire was selected to provide insight into differences in responses between underachieving and achieving gifted students on locus of control for the academic environment. Crandall's Intellectual Achievement Responsibility Questionnaire is ideally suited for examining the school environment. The instrument reports acceptable reliability and validity and is suitable for the range of grade levels selected for this research. The instrument also has the benefit of being a group administered test. For these reasons, Crandall's Intellectual Achievement Responsibility Questionnaire formed part of the test battery.

Scale of Intrinsic Versus Extrinsic Orientation in the Classroom (second year only)

The Scale of Intrinsic Versus Extrinsic Orientation in the Classroom (Harter, 1980) utilizes a self-report questionnaire to examine the educational implications of motivation. Test format is identical to Harter's Perceived Competence Scale utilizing the "structured alternative format" where the student must first decide which individual is most like him or her and then the degree to which this person is like them. The Scale of Intrinsic Versus Extrinsic Orientation in the Classroom is also a group administered test that appears to have suitable ecological validity in the attempt to construct the question in a manner that would be meaningful to students.

According to Harter (1980) the scale questions

> To what degree is a child's motivation for classroom learning determined by his or her intrinsic interest in learning and mastery, curiosity, preference for challenge in contrast to a more extrinsic orientation in which the child is motived to obtain teacher approval and/or grades, and is very dependent on the teacher for guidance? (p. 5)

The test reports five individual components of intrinsic motivation. These components involve: (PC) preference for challenge versus preference for easy work assigned, (CI) curiosity/interest versus pleasing the teacher and getting grades, (IM) independent mastery versus dependence on the teacher, (IJ) independent judgment versus reliance on the teacher's judgment, and (IC) internal criteria for success/failure versus external criteria. The test has been successfully applied across a number of age levels to examine developmental change.

Factor analysis reveals a five-factor solution that reflects the five sub-scales identified in the test. The average loading for the designated factors is between .46 and .53 with no single item systematically cross-loading on other factors. A Kuder-Richardson 20 reliability was conducted on 3000 students in three states. Reliability averages for grades seven through nine are .65, .62, .57, .54, and .59 for challenge, independent mastery, curiosity, judgment, and criteria sub-scales respectively. In a study of students from an

"open" education system versus a "traditional" education system Harter (1982) reported the ability of the test to discriminate between the two different groups. Similarly, Silon and Harter (in press) reported discriminant validity of the scale with educable mentally retarded children ages 10 to 12 in a segregated class and their chronological age peers. Predictive validity is being explored with a correlation reported between the preference for challenge (PC) sub-scale and the mean number of letters in an anagram.

The Scale of Intrinsic Versus Extrinsic Orientation in the Classroom is appropriate for this research. The reliability and validity is acceptable and the test content suitable for the students being tested. Caution, however, must be exercised as the test has not been applied to a gifted population. Harter (1980) reports that the scale has been successfully employed by colleagues as part of a diagnostic battery particularly with students who are not achieving in school.

The Scale of Intrinsic Versus Extrinsic Orientation in the Classroom was expected to support results from the test battery on motivation. In particular, results from the Scale of Intrinsic Versus Extrinsic Orientation in the Classroom would be expected to be similar to those from Crandall's Intellectual Achievement Responsibility Questionnaire since both are reported to measure locus of control in academic environments. The Scale of Intrinsic Versus Extrinsic Orientation in the Classroom is ideally suited for use in the school environment. The instrument reports acceptable reliability and validity and is suitable for the range of grade levels selected for this research. The instrument also has the benefit of being a group administered test. For these reasons, Crandall's Intellectual Achievement Responsibility Questionnaire formed part of the test battery.

Strategy Measurement

Measurement instruments used to examine strategy factors primarily focused on critical thinking skills, the selection of appropriate strategies, and the application of appropriate strategies. Instruments are not available which would directly measure

strategy, however, indirectly, through the examination of students' approaches to tasks requiring critical thinking skills, reading awareness, and monitoring of errors strategy factors can be assessed.

Cornell's Critical Thinking Test examined twelve aspects of students' critical thinking: 1) Grasping the meaning of a statement; 2) Judging whether there is ambiguity in a line of reasoning; 3) Judging whether certain statements contradict each other; 4) Judging whether a conclusion follows necessarily; 5) Judging whether a statement is specific enough; 6) Judging whether a statement is actually the application of a certain principle; 7) Judging whether an observation statement is reliable; 8) Judging whether an inductive conclusion is warranted; 9) Judging whether the problem has been identified; 10) Judging whether something is an assumption; 11) Judging whether a definition is adequate; and 12) Judging whether a statement made by an alleged authority is acceptable. The Paris Reading Awareness Questionnaire provided a measure of the student's understanding of appropriate strategies involved in reading. The ability to utilize these strategies in an assigned task was measured by the Error Detection Task. These test instruments formed the first year battery on strategies and the results influenced both the selection of the second year instruments and the grouping of students into motivational and strategy variables. All instruments from the first year were repeated to determine strategy consistency over the two years. The instruments were reported to have a reliability and validity within acceptable limits. Also a comprehensive report providing Alberta norms, reliability, and validity for the Paris Reading Awareness Questionnaire and the Error Detection Task is currently being analyzed (Mulcahy, Norman, Peat, Clifford, Andrews, Cho, Marfo, & Darko-Yeboah, in press).

Included in the second year was the Vygotsky Blocks. This test was added to the battery to determine whether any groups might exhibit developmental lags in concept formation. All instruments from the first and second year, that were predominantly measures of thinking skills, strategy acquisitions and strategy application, were group administered tests. The Vygotsky Blocks test, which measures developmental lags, was an

individually administered test. Together these instruments provided a broad spectrum of strategy variables that were expected to be evident in academic achievement.

Cornell Critical Thinking Test (administered both years).

Critical thinking skills were assessed through the Cornell Critical Thinking Test. The concept of critical thinking emerged as a composite of attitudes, knowledge, and skills (Modjeski and William, 1983; Morse & McCune, 1957). This composite included inquiry involving the ability to recognize the existence of problems and the ability to recognize what is asserted to be true. Ennis's (1961) basic factors are focused on one important kind of thinking, the ability to make a correct assessment of statements. He concedes that areas such as the judging of value statements and important kinds of skills such as creative thinking have been excluded.

The Cornell Critical Thinking Test was developed by R. A. Ennis (1961) and consists of two forms, Level X, appropriate for use in grades five through high school and Level Z most effectively used for grades 10 through college. The Cornell Critical Thinking Test, Level X used in this research, is a motivating science fiction story where students are asked to think critically about problems that arise. The Cornell Critical Thinking Test takes the form of an adventure with the landing on a new planet and the search for fifteen men previously lost on the same planet. Through an investigation into survival on the new planet, abilities in critical thinking skills are measured. This test provides a highly motivating situation which, although not completely reproducing a reality situation, does prevent it from becoming a strictly paper and pencil situation. Sections include induction, credibility, deduction and identification of assumptions. The areas of measurement are as follows: Judging Facts as Evidence in Support of Hypothesis (23 items); Judging Reliability of Sources of Information (24 items); Drawing Logical Conclusions from Data (14 items); and Recognizing Unstated Assumptions (10 items). In the Judging Facts as Evidence in Support of Hypothesis section the students are asked to respond to each

statement as to whether it supports the Health Officer's idea that the other group are all dead, contradicts the idea or neither supports or contradicts the Health Officer's idea. A typical statement reads "The first group's truck is missing" (p.3). In Judging Reliability of Sources of Information the student is asked to decide whether statement A or B is more believable or whether they are equally believable. An example of such a statement is "A. The mechanic says, 'I think there are 40 of them'. B. The anthropologist says, 'No, I think there are only 37'. C. A and B are equally believable." (p. 6). Drawing Logical Conclusions from Data requires the student to decide what follows from the reasons given and uses statements such as " 'All Earth people are able to talk. These are Earth people.' Which follows? A. They are able to talk. B. They are unable to talk. C. If people are able to talk, they are from Earth." (p. 11). In the Recognizing Unstated Assumptions section the student is asked to select the ideas that are probably taken for granted. An example of a question is " 'Since about half of the villagers have very short hair, I think that at least half are male.' Which is probably taken for granted? A. Half are female. B. All males have short hair. C. Only males have short hair." (p. 15).

In research into academically able young adolescents Crittenden, Kaplan, and Heim, (1984), found this test motivating for the students and a useful measurement tool. In their research on how effective study skills develop in academically able young adolescents, they reported this test to be useful in assessing goal orientation, activity structure, scholarly skills, lecture mastery, textbook mastery, examination mastery and self-mastery. It would appear that the Cornell Critical Thinking Test Level X is a useful tool to examine a student's ability to correctly assess a statement. The examination of critical thinking allows for an understanding of the student's ability to problem solve, particularly in the area of heuristics, the representation of a problem and devising a plan. It also provides an insight into metacognition skills including knowing when to apply specific heuristics or knowledge and the monitoring of performance to ensure a correct line of reasoning. The Cornell Critical Thinking Test appears to be a valid test useful in the

assessment of "good thinking" and the strategies children employ to arrive at conclusions to statements.

Reliability reported by Ennis and Millman (1961) based on a seventh and eighth grade population of 110 students ranged from .89 to .85. Test reliability was also found to be high at .904 reported by Pauk and Cassel (1971). Validity was inferred from intercorrelations between the critical thinking test, reading scores, and intelligence test scores. Ennis and Millman reported a correlation between intelligence test scores and critical thinking test results to be .49 to .39. Reading scores were found to be correlated between .58 to .40. They point out that the critical thinking test was measuring other factors in addition to reading ability and intelligence.

Cornell's Critical Thinking Test was selected to provide insight into differences in responses between underachieving and achieving gifted students on critical thinking skills. Although the test measures only three aspects of thinking skills, the task is described as being motivating and in keeping with demands expected in the school environment. The instrument reports acceptable reliability and validity and is suitable for the range of grade levels selected for this research. The instrument also has the benefit of being a group administered test. For these reasons, the Cornell Critical Thinking Test formed part of the strategy test battery.

Paris Reading Awareness Questionnaire (administered both years)

The Paris Reading Awareness Questionnaire (Paris, 1985) contains questions measuring the student's ability to evaluate, plan, and regulate skills involved in reading. A choice of three responses is offered for each question. An example of a question is " How are the last sentences of a story special? a. They are exciting, action sentences. b. They tell you what happened. c. They are harder to read." The student chooses the most appropriate response from the statements given, thereby reflecting their reading strategy. A reliability correlation of $r = .55$, $p < .001$ was reported by Paris (1985), based on test-retest for a

group of 544 elementary school 3rd and 5th grade students after an eight month interval. No floor or ceiling effects were observed for either the 3rd or 5th grades. The Strategy Program for Effective Learning and Thinking (S.P.E.L.T.) project examined students in grades 4 and 7 and found excellent discriminant validity with significant differences at the level of $p = 0.0001$ between different diagnostic categories. Means of 27.0, 29.5, and 33.4 at the grade 4 level and 30.9, 33.8, and 36.1 at the grade 7 level were found for Learning Disabled, Average, and Gifted groups respectively (Mulcahy, Norman, Peat, Clifford, Andrews, Cho, Marfo, & Darko-Yeboah, in press). This task appears appropriate to measure evaluation of one's self and the task, planning ahead, monitoring one's progress, and the use of strategies to reach specific goals.

The Paris Reading Awareness Questionnaire was selected to provide insight into differences in responses between underachieving and achieving gifted students on selection of appropriate reading strategies. The Paris Reading Awareness Questionnaire has been designed for the school environment. The instrument reports acceptable reliability and validity and is suitable for the range of grade levels selected for this research. The instrument also has the benefit of being a group administered test. For these reasons, the Paris Reading Awareness Questionnaire formed part of the test battery.

Error Detection Task (administered both years)

Strategies were also assessed through an Error Detection Task (Mulcahy, Norman, Peat, Clifford, Andrews, Cho, Marfo, & Darko-Yeboah, in press). The Error Detection Task was used to determine if underachieving gifted children monitor their comprehension regarding whether the information is logical within the context of the passage. One grade-appropriate story as well as a more difficult passage are presented to the student. Within each story are a number of incongruous words and scrambled sentences. The child underlines the words or sentences that do not make sense. The ability to detect errors is considered to be a measure of monitoring strategies. Such strategies would include

adjusting reading rate, using contextual clues, re-reading of areas that are unclear, checking to ensure understanding of content, comparing and linking of the text, and asking oneself questions while reading to ensure comprehension of content.

Concurrent validity has been reported from the S.P.E.L.T. project through the use of correlational analysis between the Error Detection task and the Reading Comprehension subtest of the Canadian Achievement Test (Mulcahy, Norman, Peat, Clifford, Andrews, Cho, Marfo, & Darko-Yeboah, in press). The correlation was significant for Grade 7 ($r = .44$, $p < 0.001$) and for Grade 4 ($r = .35$, $p < 0.001$). Inter-rater reliability has also been calculated for a group of 20 protocols with results reported to be an overall agreement of 82 percent. This task appears appropriate to measure students' ability to monitor their reading errors.

The Error Detection Task was selected to examine the relationship between the student's ability to state the most appropriate strategy in reading (Paris Reading Awareness Questionnaire) and the student's ability to monitor reading comprehension. The Error Detection Task was constructed for use in the school and has selected passages for each grade level to be examined in this research. The instrument also has the benefit of being a group administered test. For these reasons, the Error Detection Task formed part of the test battery.

Vygotsky Blocks (administered second year only)

Vygotsky (1939, 1966) addressed the role of language as the social means of cognition. He also examined the notion of cognitive styles, an individual's predominant mode of behavior when approaching different cognitive tasks. Vygotsky (1966) defines higher cognitive processes to be the mental processes of logical memory, verbal thinking, voluntary attention, and concept formation. These activities involve abstraction, differentiation, generalization, analysis, and synthesis. The common element of all these activities is the acquisition of a social means of cognition found in language. Language is

the mediator of social and psychological discourse and thus has a significant role in the formation of all higher cognitive functions.

Inner speech is viewed by Vygotsky (1939) as closely connected to the thought process. Inner speech serves to solve problems. The bond between language and thought is presented by Vygotsky (1939) as "a living process: thought is brought forth in words. The word, deprived of thought, is a dead word. ...But a thought which has not been embodied in words remains a shadow." (p. 52). Conceptual problems are solved through a language system that directs the cognitive operations, controlling the course of development, and channeling this development toward a solution (Vygotsky, 1966).

The Vygotsky blocks examine the capacity to learn through an "inter-functional analysis" which examines the changes in an individual's thinking given instructional intervention over time. The blocks demand the use of higher cognitive processing mediated through language.

The Vygotsky blocks consist of twenty-two blocks with five colors, six geometric shapes and two different sizes and heights. Students are directed to group these blocks into four categories labelled Lac, Mur, Bik, and Cev. The category of the block is written on the down side of the figure. The students are initially provided with the solution to the location and identity of one block. If they have not arranged the blocks according to the prescribed solution the examiner will reveal another block that would be the best clue to the correct solution. The student then rearranges the blocks until the solution has been arrived at or until all the blocks have been turned over. The student is expected to be able to verbalize the solution.

Through observing the individual's actions in solving the block problems, Vygotsky (1966) postulated that stages of development in the process of concept formation could be perceived. These stages involve syncretic thinking, complex thinking, and conceptual thinking. Yu (1981) provides further elaboration on these stages. In the stage of syncretic thinking the student depends on subjective impressions and syncretic images.

Syncretism involves the combining of different forms of belief or practice into one image. This process represents thinking to be predominantly perceptually oriented. Three substages for this group are a trial and error method, a syncretic visual image (spatial or temporal grouped) method, and a composite group (shared common origin but no internal connections) method.

In the complex thinking stage the student depends on concrete and factual material to produce abstract deductions. The emphasis of this stage is on direct experience. There are five substages of this group. The associative complex method involves grouping on the basis of similarity between one block as the control and matching all the others to this control (eg. the block is red so group according to color). The collective complex method groups according to complementary associations and similarities (eg. grouped according to different shapes or different heights). In the chain-complex method grouping is according to associative and collective complexes (eg. all squares are grouped and then the student notices color so changes the criterion). The diffuse complex method groups on the basis of remote bonds between objects (eg. trapezoids with triangles because triangles can fit into trapezoids). The highest grouping of this substage is the pseudo concept method. Here the student categorizes according to perceptually similar phenotype at a concrete level rather than an abstract level.

The stage of conceptual thinking involves the use of abstractions and generalizations. The student is now able to isolate the single traits from the concrete whole. The partial abstraction method is a substage of this level where the student places blocks together that share groups of traits weighting some traits over others. In the potential concepts method a grouping is formed on the basis of a single abstracted trait. In the potential concepts method objects are united together but only a single trait is abstracted. Finally the true concepts method forms groups "on the basis of the re-structuring of a child's complexes and concepts, and synthesizing both the processes of abstraction and generalization. At this stage the word ceases to serve as the arbitrary referencing function

in the forming of a concept. The word has now become the abstract symbol of the concept." (Yu, 1981, p. 94). The use of true concepts demonstrates the use of the higher cognitive processing mediated through language.

Reliability and validity of the Vygotsky blocks is not available; however, the test has been generally validated as a research instrument in other studies (Ghuman, 1975; Harrington, 1969; Stewin, 1968; Stones, 1970, Stones & Heslop, 1968; Yu, 1981). For the purpose of this study administration and scoring were conducted using the Penny (1951) scoring system and using the results to categorize students according to the different stages of concept formation. This instrument was particularly useful as a qualitative measure to determine whether any one student or group of students revealed significant developmental lag in concept formation. Since all students are in Junior High, the expectation was that all would be able to operate at the true concept level.

Interaction Between Motivation and Strategies Measurement

The interaction between motivation and strategies was examined through the Learning Process Questionnaire (LPQ) and the semi-structured interview. The LPQ, modified for Junior High School, examines students' approaches to learning. The semi-structured interview obtained qualitative information on students' attitude toward school and their perceived motives and strategies. The Learning Process Questionnaire and the semi-structured interview were introduced in the second year as a result of the significant differences between underachieving and achieving gifted students on motives and strategies as related to the school environment.

Learning Process Questionnaire: Revised for Junior High (administered second year only)

The Learning Process Questionnaire assesses students' approaches to learning under the broad categories of deep, achieving, and surface. The three stage model

examines the processes of motives and strategies. Achievement and underachievement can thus be related to personal and situational factors. A deep approach would encompass students with good academic performance, self-concept, and satisfaction with their level of performance. The school environment could interfere with their internal locus of control and desire to learn. An achieving approach is characterized by many of the traits of the deep but is less strongly attached to the experience of learning and more highly attached to the perceived outcomes. The surface approach student would be expected to be poor in academic performance and motivation but could be good in recall of factual detail when the material is perceived as appropriate. Biggs (1985) describes a hierarchy of approaches to learning

> on the basis of their relationship (at least) with complexity of outcome. Deep would be highest, leading to the most complex outcomes, surface the least personally involving and leading to low structure-high factual outcomes, and achieving in between these two but nearer to deep.
>
> The analysis so far paints only a very broad picture, from which several features are missing:
>
> (a) How do personal, situational, and process variables interact to affect outcome?
>
> (b) How can one explain the dynamics of this interaction? (p. 191)

Although these two questions are not addressed through the LPQ, an initial profile of student learning is suited for this study on underachieving gifted students.

The Learning Process Questionnaire (Biggs, 1987) examines the relationship between motives and strategies through administration of a paper and pencil self-reporting task. A profile of the student's learning is produced from responses on a 5-point scale to a series of items related to deep, achieving, and surface motives and deep, achieving, and surface strategy. Students are asked to respond to questions such as:

> I find that at times my school work can give me a feeling of deep personal satisfaction. (Deep Motive)
>
> I try to obtain high marks in all my subjects just because of the advantage this gives me in competing with others when I leave school. (Achieving Motive)
>
> I chose my present subjects mainly because of career prospects when I leave school, not because I'm particularly interested in them. (Surface Motive)

While I am studying, I often try to think of how useful the material that I am learning would be in real life. (Deep Strategies)

I regularly take notes from suggested readings and put them with my class notes on a topic. (Achieving Strategies)

I tend to study only what's set; I usually don't do anything extra. (Surface Strategies)

The Learning Process Questionnaire (LPQ) was designed for students at the middle and senior secondary school level in Australia. Wording of questions on the Learning Process Questionnaire was modified by J. Biggs and R. Mulcahy (personal communication, October, 1987) to accommodate Canadian terminology and Junior High appropriateness. Validity and reliability reported for the Learning Process Questionnaire would be expected to be appropriate for the Learning Process Questionnaire (Revised) since caution was exercised to avoid changing the meaning of questions or making unnecessary changes.

Cornell (1986) using the Learning Process Questionnaire with a sample of sixty students aged 14 and allowing four months between testings reported test-retest reliabilities to be .63, .52, .70, .72, .60, and .49 on deep motives, deep strategy, achieving motives, achieving strategy, surface motives, and surface strategy respectively. Internal consistency, as measured by the alpha coefficient, was reported to be .56, .67, .68, .67, .46, and .51 on deep motives, deep strategy, achieving motives, achieving strategy, surface motives, and surface strategy respectively. Edwards (1986) reports similar test-retest reliabilities and internal consistency with a sample of sixty-nine students and a four month period between testing. Test-retest reliabilities were .60, .63, .67, .68, .70, and .60 and the internal consistency alpha coefficient was reported to be .54, .65, .67, .73, .45, and .55 on deep motive, deep strategy, achieving motive, achieving strategy, surface motives, and surface strategy respectively for grade eleven students. Both internal consistency and test-retest reliability are satisfactory.

Factorial validity was reported to be satisfactory by Watkins and Hattie (1981) on the Student Approaches to Learning and Studying (SPQ). On the basis of the similarities between the LPQ and the SPQ, Biggs (1987) defends the position for the safe extension of

the validity results from Watkins and Hattie to the LPQ. Construct validity was noted in the high correlation between students high on deep and achieving approaches and those students anticipating extending their schooling. Similarly, correlations between students' estimates and satisfaction of their performance and the SPQ are consistent. The average correlation between performance and deep was .20, between performance and achieving .30, and between performance and surface achievers -.15. The correlations are significant statistically with this sample size of 255 from a homogeneous population.

Biggs (1987) provides one of the few models that examines motives and strategies in the student's approach to learning. The process variables have a direct effect on the student's academic performance. The adapted Learning Process Questionnaire was selected to provide an insight into the relationship between motives and strategies within the various underachieving and achieving gifted groups. The instrument reports acceptable reliability and validity and is suitable for the range of grade levels selected for this research.

Semi-Structured Interview (administered second year only)

A semi-structured interview was conducted using questions based on Stelmaschuk's (1986) qualitative analysis and Hitchfield's (1973) long-term national study of gifted children.

The semi-structured interview questions included:

-How much do you like school?
-Which subjects do you find most interesting?
-Which do you find boring?
-What is your favourite subject?
-Can you say what has made it your favourite subject?
-How much do you like getting things down on paper?
-What is your idea of a good teacher?
-Does the 'ideal teacher' make a difference?
-What is your idea of a poor teacher?
-Is there anything you would like to change about school if you could?
-Tell me about your friends.
-What is it you like most about a friend?
-Tell me about your interests or hobbies.
-Do you write stories or poems?

-How much do you use books? Tell me the names of some books you've read recently, say in the last month.
-How many books do you own?
-As a reader how do you compare with other children?
-What sort of sports or physical activities are you involved with?
-If you were to rate your physical abilities on a scale of 1 to 10 with 10 being the highest, how good are you at sports?
-If you had your choice of whether to do a team sport or an individual sport which would you choose? Why?
-How well do you think you are achieving at school.
-How do you think you could achieve better at school?
-How do you feel you could do better in your own academic achievements?
-How did last year at school compare to this year?
-Do you have any brothers or sisters? Tell me about them.
-What are the other members of your family interested in?
-Tell me about yourself. What kind of a person are you?
-What would you like to be when you grow up?
-How does a person become a(n) _____?
-What would your parents like you to be when you grow up?
-You've lived ___ years now, what do you think about life?
-Do you ever think about serious things?
-If you were to die, would anyone care?
-Have you ever puzzled about something because you couldn't decide whether it was real or not real?
-When you come across a brand new task, something you've never done before, what goes through your mind?
-What motivates you, what keeps you going at school?

Students' responses determined the degree of elaboration requested on each query. Modifications of questions and the inclusions of different questions were made to direct the study toward motivational and strategy factors. Results enabled a more complete examination of the role of personal, situational, and process variables and the dynamics of the interaction of these factors in this qualitative section of the triangulation method (Jick, 1979) employed in this study.

E. Collection of Data

Initial data were collected over a five-week period of time starting at the end of January, 1987, and finishing by the end of February of that year. At this time the quantitative test battery consisting of the Coopersmith's Self Esteem Inventory, Harter's Perceived Competence Scale, Crandall's Intellectual Achievement Questionnaire, Cornell's Critical Thinking Test Level X, Paris's Reading Awareness Questionnaire, and the Error

Detection Task were administered to 164 students. The test battery required approximately one-hour and fifty-minutes. The first test of this battery was the Cornell's Critical Thinking Test Level X. Cornell's Critical Thinking Test Level X required the longest time period (approximately fifty-minutes) and a break was provided upon its completion. Following the break students completed Coopersmith's Self Esteem Inventory, Harter's Perceived Competence Scale, Crandall's Intellectual Achievement Responsibility Questionnaire, Paris's Reading Awareness Questionnaire, and the Error Detection Task in the order listed.

Students were informed that they had been selected for testing because they appeared to have good potential as measured on the Lorge-Thorndike and Canadian Test of Basic Skills they had written earlier in class. The rationale for the testing was explained as a research project to discover factors that enable students to achieve better. The benefits to students were explained in terms of potential changes to the education system to suit student needs and interests. All subjects were informed that responses would be kept confidential and that results would be reported on the group response rather than on individual responses. Students were advised to answer honestly and in the best possible manner.

The complete battery from the first year was re-administered to the 21 subjects in the second year to measure test and group consistency. Additional tests administered in the second year were the Self-Report Scale of Intrinsic Versus Extrinsic Orientation in the Classroom (Harter, 1981) for motivation factors. For motivation and strategy the Junior High Learning Process Questionnaire (Mulcahy & Biggs, in press) was administered. Strategies and development were also measured in a novel task utilizing the Vygotsky Blocks. Finally, a semi-structured interview was conducted using questions based on Stelmaschuk's (1986) qualitative analysis and Hitchfield's (1973) long-term national study of gifted children. Data for the second year were obtained through individual testing conducted over a four month period between January and April of 1988.

F. Analysis of Data

First year data were analyzed by multivariate analysis of variance (MANOVA) for motivational factors and for learning strategy factors. A median split based on the significant variables obtained in the MANOVA was then conducted to group students according to high and low motivational variables with high and low strategy variables. The small group of students (n = 21) in the second year allowed for an additional analysis of underachievement by including qualitative data obtained through interviews.

Scores, from the second year of testing, on the Coopersmith Self-Esteem Inventory (school subtest), the Harter Scale of Perceived Competence (cognitive subtest), the Cornell Critical Thinking Test, and the Mulcahy Error Detection Task were used to assess consistency in the median split groupings over the two years. Results from the Vygotsky Blocks Test were analysed according to developmental criteria, while Biggs' scoring method was used with the Learning Process Questionnaire results to determine the appropriate 'approach to learning' category for each student. The Scale of Intrinsic versus Extrinsic Orientation in the Classroom was scored according to Harter's scoring system with the results being graphically plotted for visual interpretation. The taped interviews were transcribed and then analysed for themes and summarized in individual case study vignettes.

Triangulation (Jick, 1979), the use of both quantitative and qualitative methods, was used to increase reliability and convergent validity as well as to present a contextual and more complete portrayal of motivation and strategy within the underachieving and achieving gifted students. This portrayal was then compared to the proposed model to assess accuracy of the model.

G. Hypotheses

The main purpose of this study was to examine profiles of underachieving gifted students and achieving gifted students on motivation and strategy variables and to propose a possible model for future research on the underachieving gifted student. Accordingly, the following null hypotheses were proposed.

1. Differences in Motivational Factors

   1.1 There will be no significant difference in motivational variables as measured by Coopersmith's Self-Esteem Inventory (School, Home, General, Total), Harter Scale of Perceived Competence (Cognitive, Social, General), and Crandall's Intellectual Achievement Questionnaire (Total Internal) between underachieving and achieving gifted students across all grades.

   1.2 For both gifted underachievers and gifted achievers there will be no difference in motivational variables within grades as measured by Coopersmith's Self-Esteem Inventory (School, Home, General, Total), Harter Scale of Perceived Competence (Cognitive, Social, General), and Crandall's Intellectual Achievement Questionnaire (Total Internal).

2. Differences in Strategy Factors

   2.1 There will be no significant difference in strategy variables as measured by Cornell's Critical Thinking Test Level X, Paris Reading Awareness Questionnaire, and the Error Detection Task between underachieving and achieving gifted students across all grades.

   2.2 For both gifted underachievers and gifted achievers there will be no difference in strategy variables within grades as measured by Cornell's Critical Thinking Test Level X, Paris Reading Awareness Questionnaire, and the Error Detection Task.

These null hypotheses provide the initial investigation into the first three questions addressed in the introduction:

(1) Do underachieving gifted students score lower on measures of motivation such as self-esteem, self-perception, and locus of control relative to gifted achievers?

(2) Do underachieving gifted students score lower on strategy measures such as critical thinking skills, reading strategies, and error monitoring skills relative to gifted achievers?

(3) Do motivation and strategy measures of underachieving gifted and achieving gifted students remain constant over grade levels?

Based on an ability to reject the null hypothesis, further investigation of motivation and strategy variables was undertaken with the intent of investigating the final four questions proposed in the introduction:

(4) Is there one common profile or are there many profiles to describe the underachieving gifted population?

(5) How are motivation and strategy patterns similar and/or different between underachieving and achieving gifted students?

(6) Is there a model that can be applied to underachieving and achieving gifted students that will incorporate motivation and strategy factors?

(7) What are the underachieving and achieving gifted students' perceptions of the school as a milieu for academic achievement?

CHAPTER IV

RESULTS

A multivariate analysis of variance (MANOVA) was conducted on the first year results, to test for significant differences between underachieving and achieving gifted students on motivational factors and strategy factors. The analysis of tests that report on subtest scores in addition to a total score requires that one of the subtests be removed from the calculation since any one score would be perfectly predictable from the sum of the others. For example, the Coopersmith Self-Esteem Inventory was comprised of a school, social, home, general, and total score. If the school, social, home, and general scores were all used in addition to the total score, the sum of the four subtests would predict the total. Since the total is dependent on the four subtests, the inclusion of all scores would artificially inflate the degrees of freedom. In addition, the calculation of a MANOVA compares the variance of all the scores entered in the calculation and creates an inverse matrix. A score of zero will be obtained on at least one of the matrices since the sum of any one score is predictable from the others. During the calculation of the inverse matrix of the MANOVA an unreal number will be created (denominator = 0). Therefore, by convention, one subtest is removed from the cluster prior to analysis.

In accordance with the conventions of the calculation of the MANOVA, the Coopersmith Self-Esteem Inventory (social) was deleted with the assumption that a degree of overlap with the social subtest of the Harter Scale of Perceived Competence would occur. The physical subtest of the Harter Scale of Perceived Competence was deleted since physical competence has not been extensively reported as a factor in academic performance. By reducing the number of dependent variables, given an n = 164 students, the effect has been to increase power. Means and standard deviations of each subtest have been included in Appendix A.

A. Differences in Motivational Factors

Motivational factors were measured by Coopersmith's Self-Esteem Inventory, Harter's Scale of Perceived Competence, and Crandall's Intellectual Achievement Questionnaire. Accordingly, the following null hypotheses were proposed.

1. Differences in Motivational Factors

   1.1 There will be no significant difference in motivational variables as measured by Coopersmith's Self-Esteem Inventory (School, Home, General, Total), Harter Scale of Perceived Competence (Cognitive, Social, General), and Crandall's Intellectual Achievement Questionnaire (Total Internal) between underachieving and achieving gifted students across all grades.

   1.2 For both gifted underachievers and gifted achievers there will be no difference in motivational variables within grades as measured by Coopersmith's Self-Esteem Inventory (School, Home, General, Total), Harter Scale of Perceived Competence (Cognitive, Social, General), and Crandall's Intellectual Achievement Questionnaire (Total Internal).

The results of the analysis between underachieving and achieving gifted students on motivational factors revealed significant differences between underachieving gifted and achieving gifted students with the F-statistic for multivariate test of equality of mean vectors = 6.0826 and $p < 0.0001$. Post hoc analysis of motivational variables revealed significant differences between underachieving gifted and achieving gifted on the Coopersmith School and Harter Cognitive factors (see Table 7).

Table 7

Post Hoc Analysis for Motivational Variables Between Underachieving and Achieving Gifted

Variable	Mean Square	Univariate F	P less than
Coopersmith School	39.2898	11.3435	0.0010**
Coopersmith Home	0.2205	0.0442	0.8338
Coopersmith General	5.4656	0.3125	0.5770
Coopersmith Total	352.5233	1.4555	0.2295
Locus Total Internal	9.4715	0.7430	0.3901
Harter Cognitive	7.2967	35.4247	0.0001**
Harter Social	0.5914	1.0489	0.3074
Harter General	0.6973	2.1867	0.1413

There were no significant differences between grades with the F-statistic for multivariate test of equality of mean vectors = 1.0885 with $p < 0.3570$. Post hoc analysis of motivational variables revealed no significant differences between grades as expected from the multivariate analysis (see Table 8).

Table 8

Post Hoc Analysis for Motivational Variables Between Grades

Variable	Mean Square	Univariate F	P less than
Coopersmith School	8.9615	2.5873	0.0551
Coopersmith Home	6.1729	1.2379	0.2980
Coopersmith General	15.8852	0.9084	0.4385
Coopersmith Total	311.4380	1.2858	0.2813
Locus Total Internal	2.8683	0.2250	0.8789
Harter Cognitive	0.1715	0.8327	0.4779
Harter Social	0.7219	1.2804	0.2832
Harter General	0.1532	0.4806	0.6963

Thus the null hypothesis 1.1 was rejected. Significant differences were noted in motivational variables between underachieving and achieving gifted students as measured by Coopersmith's Self-Esteem Inventory (School) and Harter Scale of Perceived Competence (Cognitive). Achieving gifted students scored significantly higher on both the Coopersmith's Self-Esteem Inventory (School) and the Harter Scale of Perceived Competence (Cognitive). There were, however, no significant differences between grades.

No interaction was revealed across grades or achievement with the F-statistic for multivariate test of equality of mean vectors = 1.2284 and $p < 0.2221$. Post hoc analysis for interaction with motivational variables revealed no significant differences as expected from the multivariate analysis (see Table 9).

Table 9

Post Hoc Analysis for Interaction with Motivational Variables

Variable	Mean Square	Univariate F	P less than
Coopersmith School	7.8974	2.2801	0.0816
Coopersmith Home	6.7465	1.3529	0.2594
Coopersmith General	34.8875	1.9950	0.1170
Coopersmith Total	400.0794	1.6518	0.1798
Locus Total Internal	4.1496	0.3255	0.8069
Harter Cognitive	0.2393	1.1616	0.3264
Harter Social	0.7385	1.3099	0.2732
Harter General	0.2687	0.8425	0.4726

Thus the null hypothesis 1.2 failed to be rejected. No significant interaction was noted in motivational variables within grades as measured by Coopersmith's Self-Esteem Inventory (School, Home, General, Total), Harter Scale of Perceived Competence (Cognitive, Social, General), and Crandall's Intellectual Achievement Questionnaire (Total Internal).

B. Differences in Strategy Factors

Strategy factors were measured by Cornell's Critical Thinking Test Level X, Paris Reading Awareness Questionnaire, and the Error Detection Task. Accordingly, the following null hypotheses were proposed.

2. Differences in Strategy Factors

> 2.1 There will be no significant difference in strategy variables as measured by Cornell's Critical Thinking Test Level X, Paris Reading Awareness Questionnaire, and the Error Detection Task between underachieving and achieving gifted students across all grades.
>
> 2.2 For both gifted underachievers and gifted achievers there will be no difference in strategy variables within grades as measured by Cornell's Critical Thinking Test Level X, Paris Reading Awareness Questionnaire, and the Error Detection Task.

The results of the analysis between underachieving and achieving gifted on strategy factors revealed significant differences between underachieving gifted and achieving gifted

students with the F-statistic for multivariate test of equality of mean vectors = 6.4630 and p < 0.0004. Post hoc analysis of specific variables revealed significant differences between underachieving gifted and achieving gifted on the Cornell Critical Thinking Test Level X and the Error Detection Task variables (see Table 10). Achieving gifted students scored significantly higher on both the Cornell Critical Thinking Test Level X and the Error Detection Task.

Table 10

Post Hoc Analysis for Strategy Variables Between Underachieving and Achieving Gifted

Variable	Mean Square	Univariate F	P less than
Paris Reading Questionnaire	20.4994	1.9034	0.1697
Cornell Critical Thinking	1104.2237	15.0117	0.0002**
Error Detection	68.1059	8.2595	0.0047**

There were significant differences between grades with the F-statistic for multivariate test of equality of mean vectors = 3.3336 with p < 0.000. Post hoc analysis of strategy variables revealed significant differences between grades on the Cornell Critical Thinking Test and the Error Detection Task (see Table 11).

Table 11

Post Hoc Analysis for Strategy Between Grades

Variable	Mean Square	Univariate F	P less than
Paris Reading Questionnaire	10.4004	0.9657	0.4106
Cornell Critical Thinking	423.1477	5.7526	0.0010**
Error Detection	31.5662	3.8282	0.0112**

Thus the null hypothesis 2.1 was rejected. Significant differences were noted in strategy variables between underachieving and achieving gifted students as measured by the Cornell Critical Thinking Level X and the Error Detection Task. There were also significant differences between grades with the number of correct responses increasing across grades.

No interaction was revealed across grades or achievement with the F-statistic for multivariate test of equality of mean vectors = 0.9109 with $p < 0.5156$. Post hoc analysis of interaction with strategy revealed no significant differences as expected from the multivariate analysis (see Table 12).

Table 12

Post Hoc Analysis for Interaction with Strategy

Variable	Mean Square	Univariate F	P less than
Paris Reading Questionnaire	10.0954	0.9374	0.4242
Cornell Critical Thinking	57.3079	0.7791	0.5074
Error Detection	3.8505	0.4670	0.7058

Thus the null hypothesis 2.2 failed to be rejected. No significant interaction was noted in strategy variables within grades as measured by Cornell's Critical Thinking Test Level X, the Paris Reading Awareness Questionnaire, and the Error Detection Task.

C. Grouping for Second Year Analysis

The Coopersmith Self-Esteem Inventory (school) and the Harter Scale of Perceived Competence (cognitive) tests for motivational factors and the Cornell Critical Thinking Test and the Error Detection Task for strategy factors demonstrated significant differences between underachieving and achieving gifted students (MANOVA). The significant motivational and strategy variables were then used in a median split to divide students into high motivation/high strategy, low motivation/low strategy, high motivation/low strategy, and low motivation/high strategy groups. In the event of one score being above and the other below the median, emphasis was given to the Coopersmith Self-Esteem Inventory (school) and the Cornell Critical Thinking Test to determine the placement. The Coopersmith Self-Esteem Inventory (school) was given precedence over the Harter Scale of Perceived Competence (cognitive) for three reasons. First the affect variable self-esteem tends to be more closely reported with motivation than does perceived competence. Second

the Coopersmith Self-Esteem Inventory asks questions directly related to school which was the predominant environmental focus of this study. Finally the range of scores on the Coopersmith Self-Esteem Inventory was greater which enabled the median split to be more accurate in the representation of two distinct groups. The Cornell Critical Thinking Test was given preference over the Error Detection Task for two reasons. First the range of scores was greater on the Cornell Critical Thinking Test than on the Error Detection Task thereby enabling the median split to be a more accurate representation of two distinct groups. Second there was no information available on the consistency of scores on test-retest with the Error Detection Task. In the event that both scores were directly on the median the student was placed in the low grouping. Rules were kept consistent with both achievers and underachievers. The frequency of each category is presented in Table 13.

Table 13

Frequency of Motivational and Strategy Groupings (Achievers n=77, Underachievers n=87)

	H. Mot./H. Str	H. Mot./L. Str.	L. Mot./H. Str.	L. Mot./L. Str.
Achiever	29	16	20	12
Underachiever	12	21	23	31

Utilizing a Chi square analysis to examine randomness resulted in a χ^2 obt.= 15.952 and χ^2 crit. .01 = 11.341. Thus, the frequency in the groupings appears unlikely to have resulted from random selection. An examination of the proportions in each category presents differences in the high motivation/high strategy and low motivation/low strategy groupings (see Table 14).

Table 14

Chi Square Proportions of Motivational and Strategy Groupings

	H. Mot./H. Str	H. Mot./L. Str.	L. Mot./H. Str.	L. Mot./L. Str.
Achiever	0.37662	0.20779	0.25974	0.15584
Underachiever	0.13793	0.24138	0.26437	0.35632

In preparation for the selection of students from each of the eight motivational and strategy groupings for testing in the second year, Grade 9 students from the first year were eliminated from the study since these students had not rewritten the Lorge-Thorndike or Canadian Test of Basic Skills and consequently, information on the consistency of their scores over two years was unavailable. This reduced the sample to 59 achievers and 68 underachievers. Other students were eliminated due to the unavailability of their test scores, changes in I.Q. score, or changes in discrepancy scores. As a result, the sample of students in the selection pool was reduced to 38 achievers and 30 underachievers (see Table 15).

Table 15

Final Number of Motivational and Strategy Subjects (Achievers n=38, Underachievers n=30)

	H. Mot./H. Str	H. Mot./L. Str.	L. Mot./H. Str.	L. Mot./L. Str.
Achiever	18	5	7	8
Underachiever	3	10	4	13

The selected sample for the second year of testing was comprised of at least one male and one female student from each median split group (n = 16). In addition, the third student in the High/High underachiever group was included. During data collection one of the Low/Low underachieving subjects noted a recent absence from school due to illness. As a result a third representative individual was selected from this median split group to ensure consistency of responses. Finally three students were included who demonstrated a consistency in I.Q. scores but a cross-over in the discrepancy score (two from achieving to underachieving and one from underachieving to achieving) resulting in a three standard deviation change in one year. Thus the final sample for in-depth study in the second year of testing was comprised of twenty-one students (see Figure 6).

Figure 6

Subjects for In-Depth Study

motives/strategy	Underachiever	Achiever
High/High	Case A (female) Case B (male) Case C (male)	Case D (female) Case E (male)
Low/Low	Case F (female) Case G (female) Case H (male)	Case I (female) Case J (male)
Low/High	Case K (female) Case L (male)	Case M (female) Case N (male)
High/Low	Case O (female) Case P (male)	Case Q (female) Case R (male)
Cross-Over	Case U (male)	Case S (female) Case T (male)

D. Consistency of the Median Split for the Sample Over the Two Years

The median split was based on the significant factors identified in the MANOVA relative to motivational variables (Coopersmith School and Harter Cognitive) and to strategy variables (Cornell Critical Thinking Skills and the Error Detection Task). The division of students into high motivation/high strategy, low motivation/low strategy, high motivation/low strategy, and low motivation/high strategy groups was obtained through use of the medians obtained from all 164 students in the first year and each grade level (see Tables 16 to 19). Consistency in the groupings was assessed by comparing the second year scores to the first year median split results since there was an insufficient number of subjects in the second year to obtain a meaningful calculation of median splits. This procedure was deemed appropriate on the basis of the original calculation of the median split groupings from a large number of students (164). Such a calculation would be expected to be consistent over the two years. In addition, the test-retest results would be expected to be consistent over the two years on the basis of the test-retest reliability on many of the instruments used in the testing. Where test-retest reliability results were not

available, there was nothing inherent in the tests that would indicate that test-retest patterns would not be consistent.

Table 16

Grade Six Means, Standard Deviations, and Medians of the First Year Results from Significant Variables

Variables	Mean	Standard Deviation	Median
Coopersmith School	5.718	1.605	6.00
Harter Cognitive	3.271	.478	3.29
Cornell Critical Thinking	30.936	9.18	33.50
Error Detection	3.795	2.386	3.00

Table 17

Grade Seven Means, Standard Deviations, and Medians of the First Year Results from Significant Variables

Variables	Mean	Standard Deviation	Median
Coopersmith School	5.5	2.019	6.00
Harter Cognitive	3.173	.535	3.14
Cornell Critical Thinking	31.772	9.803	30.50
Error Detection	4.761	2.549	5.00

Table 18

Grade Eight Means, Standard Deviations, and Medians of the First Year Results from Significant Variables

Variables	Mean	Standard Deviation	Median
Coopersmith School	4.643	2.046	5.00
Harter Cognitive	3.256	.496	3.29
Cornell Critical Thinking	35.786	8.584	35.00
Error Detection	3.714	3.263	3.00

Table 19

Grade Nine Means, Standard Deviations, and Medians of the First Year Results from Significant Variables

Variables	Mean	Standard Deviation	Median
Coopersmith School	5.216	2.043	6.00
Harter Cognitive	3.328	.486	3.43
Cornell Critical Thinking	37.824	7.822	38.00
Error Detection	5.622	3.419	5.00

There was stability in the eight underachieving and achieving motive/strategy groupings for all but two of the eighteen students comprising these groupings. With the exception of the high motive/high strategy underachieving group, the other seven groups retained their original membership in the second year of testing.

Two individuals from the high motive/high strategy underachieving group (Case A and Case B) exhibited changes in their groupings. Both cases represented underachieving gifted students who were considered in the first year to be high in motives and high in strategies. Case A, a female underachiever, changed from high motives and high strategies to low motives and low strategies. Case B, a male underachiever changed from high motives and high strategies to low motives and high strategies. The third individual in this group, Case C, maintained the high motive/high strategy profile. Whether he would continue to remain in the underachieving group is questionable on the basis of his change of interest in academic pursuits. When achievement results become available for the next year he might well be in the cross-over group.

The three crossover students exhibited consistency in motivation and strategies although not in achievement over the two years. Case S displayed high motivation and high strategies over the two years while Cases T and U displayed low motivation and high strategy over the two years of testing.

E. Results of Test Measurements

Motivational factors which are reported in the first section include Coopersmith's Self-Esteem Inventory, Harter's Perceived Competence Scale, Crandall's Intellectual Achievement Responsibility Questionnaire, and the Scale of Intrinsic Versus Extrinsic Orientation in the Classroom. In the second section, strategy measures reported include the Cornell Critical Thinking Test, Paris Reading Awareness Questionnaire, and the Error Detection Task. Interaction measurements are reported in the third section and include the Learning Process Questionnaire and the Semi-Structured Interview Case Studies. In each

figure of these three sections, the headings refer to motivation and strategies respectively. For example, "Low/High" refers to students with low motivation and high strategies. Beneath these headings are the underachieving and achieving gifted groupings abbreviated as "UAG" and "AG" respectively. The "X-Over" group (Case S high/high; Case T low/high; Case U low/high) contains the three students whose academic profiles changed over the two years.

Caution must be exercised when interpreting trends from the charts due to the small sample size, the ability of scores to deviate without being significant, the poor correlations between some of the subtests, and the expected regression toward the mean. A liberal interpretation will be employed in the reporting of trends and where a consistent pattern is noted this will be elaborated in the discussion. The trends are reported as follows:

(1) assessment of the relationship of underachieving and achieving students in each of the four motive/strategy groupings.

(2) determination of patterns of similarities and differences between the high motivation, the low motivation, the high strategy, and the low strategy groupings.

(3) report of any changes between the first and second year results.

(4) notation of any individual patterns that are prominent.

Results of Motivation Measurements

Coopersmith's Self-Esteem Inventory

Items on the Coopersmith Self-Esteem Inventory are scored with a point if the student responded positively to the subtest question. The school, home, and social subtests have a total possible score of eight points each while the general subtest has twenty-six possible points. The sum of the scores on school, home, social, and general is multiplied by two to arrive at the total score.

(1) Inspection of figures 7, 8, 9, 10, and 11 indicates that there is no clear pattern of difference within the groups between the underachieving gifted and the achieving gifted students within the school, social, home, general and total scales respectively.

(2) The results from the Coopersmith Self-Esteem Inventory for school indicate a consistent trend (see Figure 7) separating the median groupings. In comparison to the other motive/strategy groups, the low/low group tends to have the lowest self-esteem scores on all scales, although this is more pronounced on school (Figure 7) and total (Figure 11). The high/high, low/high, and high/low groups tend to have similar profiles on all subscales except school where low/high is lower than the two groups with high motivation.

(3) For the school scale, self-esteem is, in general, lower in the second testing. Within groups the largest absolute changes occurred in the high/high and the low/low groups, particularly with the underachievers across all scales.

(4) Although Cases F and G are in the low/low group, they seem noteworthy because of changes in the opposite direction from one year to the next. Case F had a decrease in the second year score on school (Figure 7), home (Figure 9), general (Figure 10), and total (Figure 11). Case G experienced a noticeable increase in the second year on school (Figure 7), social (Figure 8), home (Figure 9), general (Figure 10), and total (Figure 11) which was not explained by the interview material. Case H, the other member of the low/low underachieving group, remained very low for the two years.

The largest change in scores occurred for Case C on the social scale (Figure 8). This dramatic increase in social self-esteem may reflect an expressed increase in interest in school activities.

Figure 7

Coopersmith Self-Esteem Inventory (School)

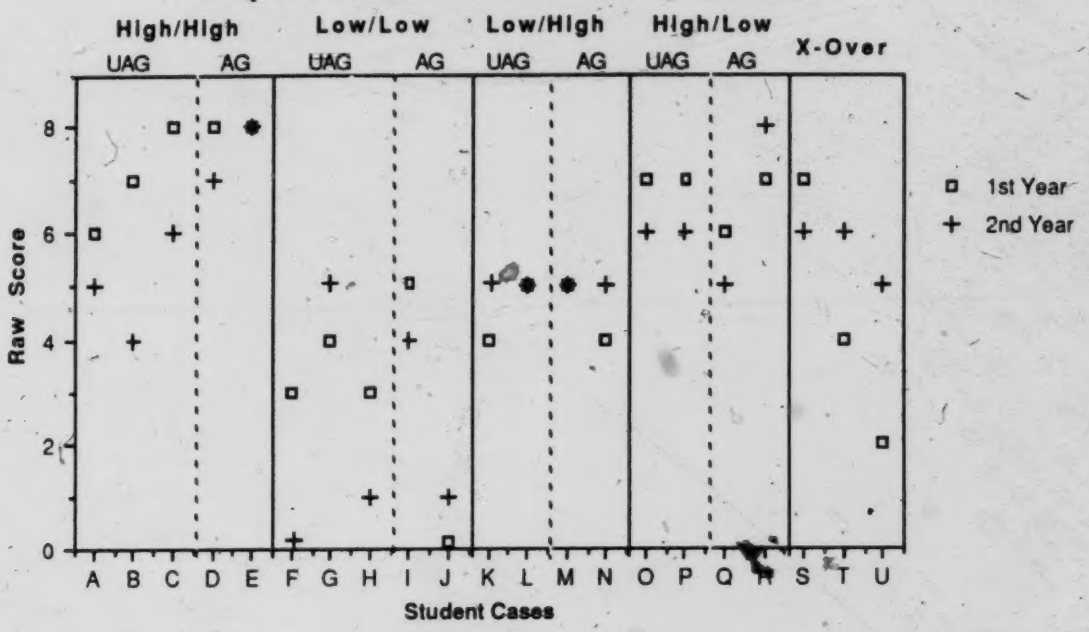


Figure 8

Coopersmith Self-Esteem Inventory (Social)

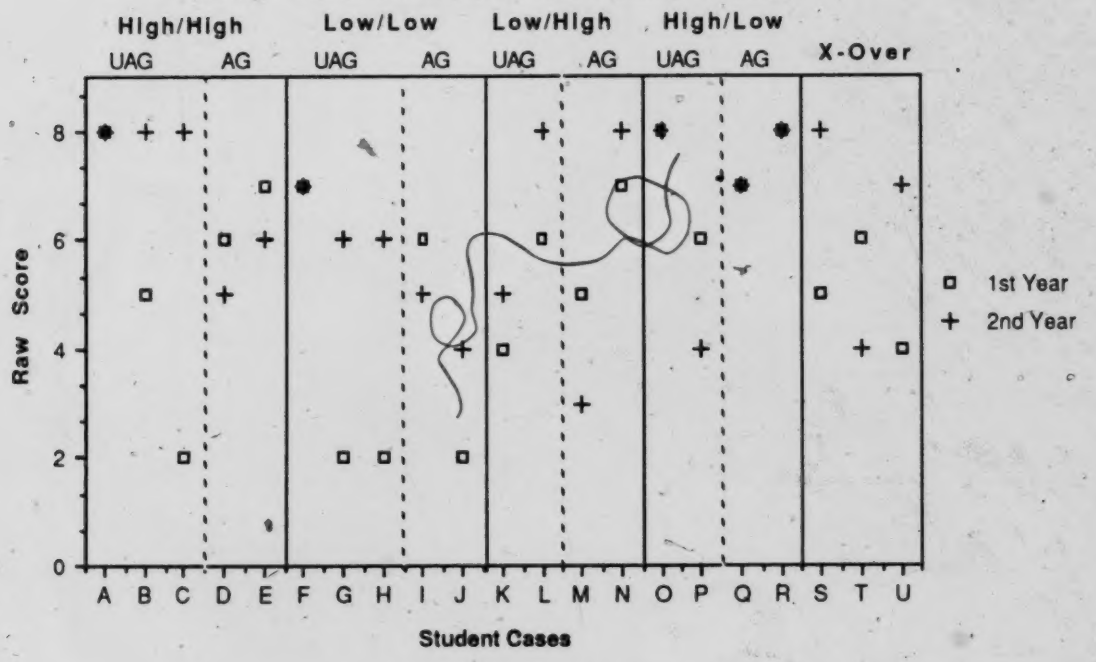


Figure 9

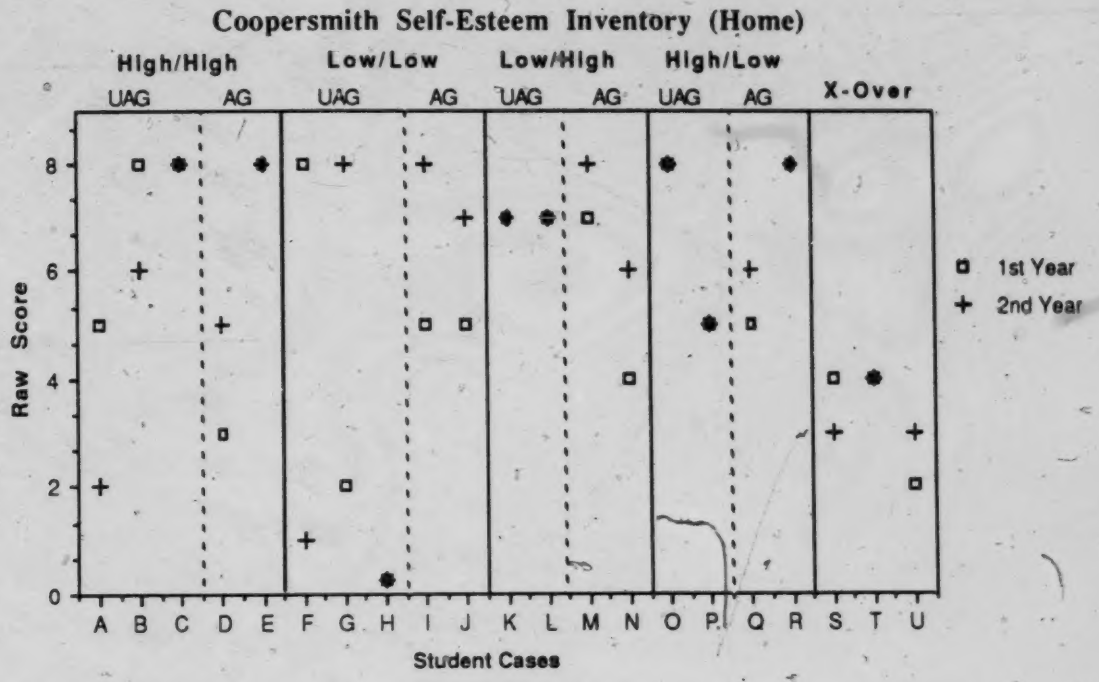


Figure 10

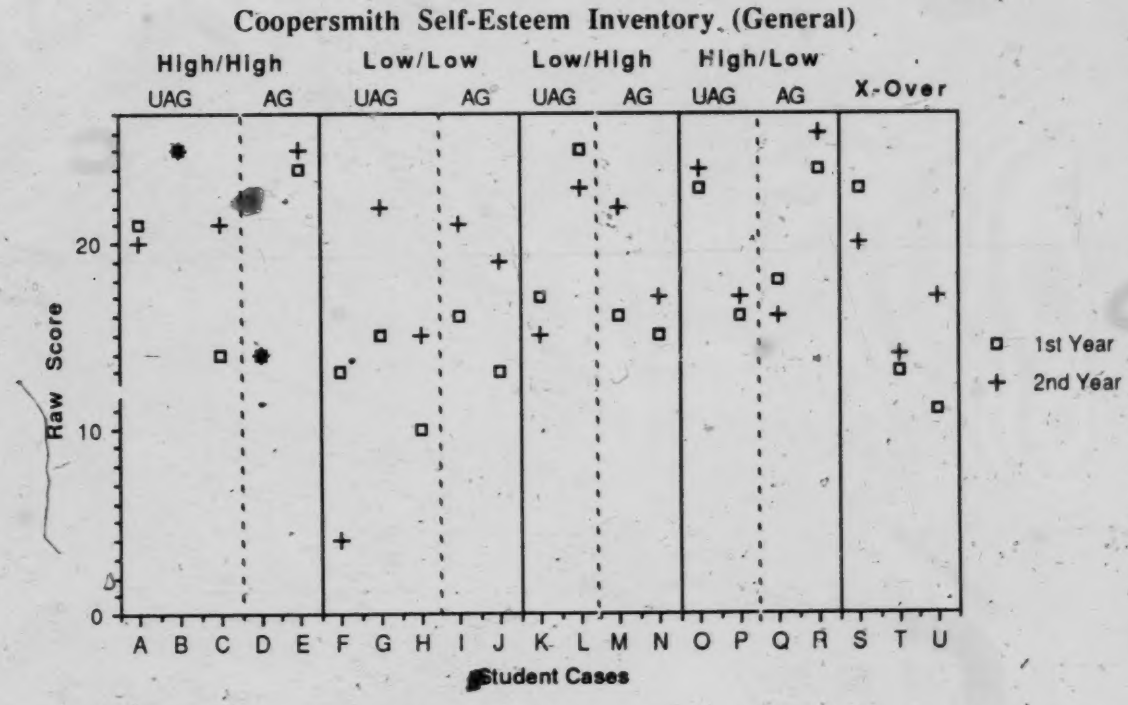
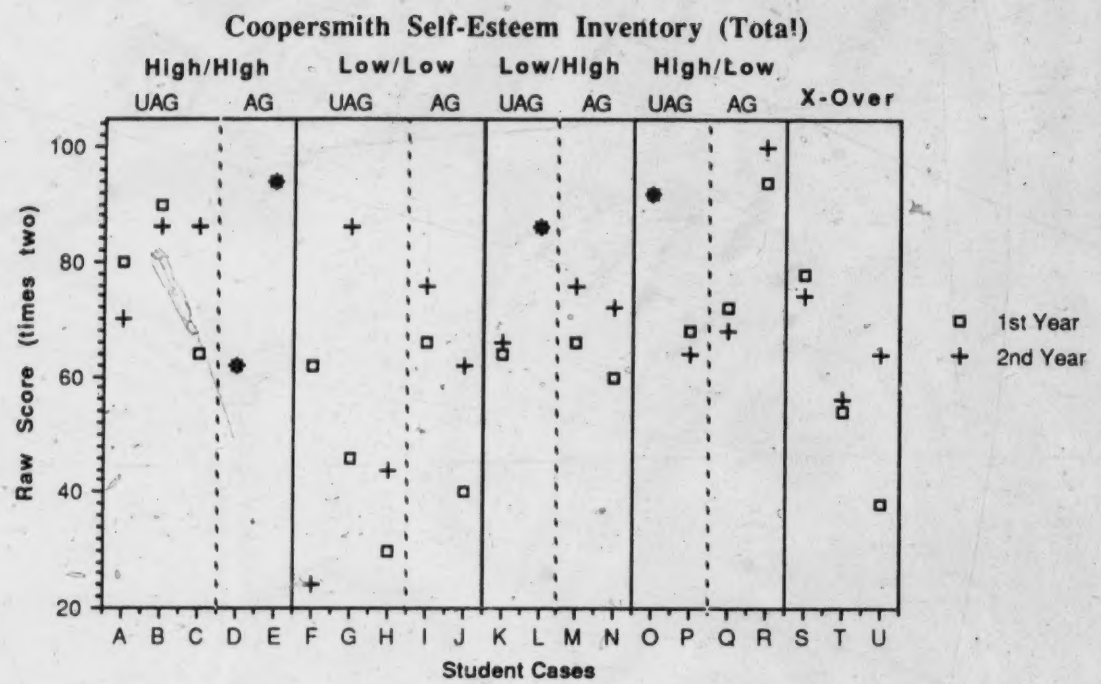


Figure 11



Harter Perceived Competence Scale

The Harter Perceived Competence Scale measures the student's self-perception through four subscales (cognitive, social, physical, and general) with each subscale posing seven questions. Students respond using a four point scale with the lower number representing the higher perceived competence. Individual student scores are arrived at by calculating the mean of each subtest.

(1) Inspection of Figures 12, 13, 14, and 15 indicates that there is a trend for the underachieving gifted students to have higher scores than their achieving counterparts on the social and physical subtests. Otherwise, there is little difference noted between the underachieving and achieving gifted students.

(2) There are no trends noted between the motive/strategy groups.

(3) In general scores are scattered and most students tended to have an increase in their scores in the second year on all but the physical subtest.

(4) In a comparison of scores over two years, Case C showed a considerable increase on social and physical, and a moderate increase on general. Case H, who had many chores at home, and Case J, who described a lack of friends in school, both scored low on social. Case E, who described himself as poor in sports, scored low on the physical section. Case P had a substantial increase on the general subtest, as well as moderate increase on the cognitive and social subtests. Two students (S & T) in the cross-over group had high scores on the cognitive subtest.

Figure 12

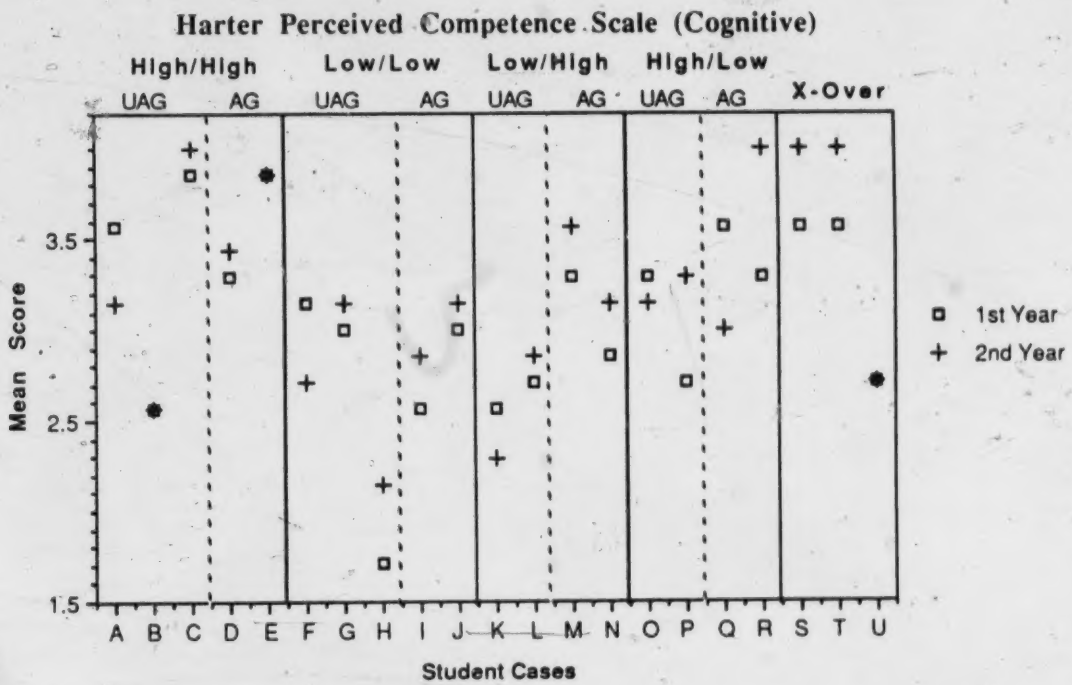


Figure 13

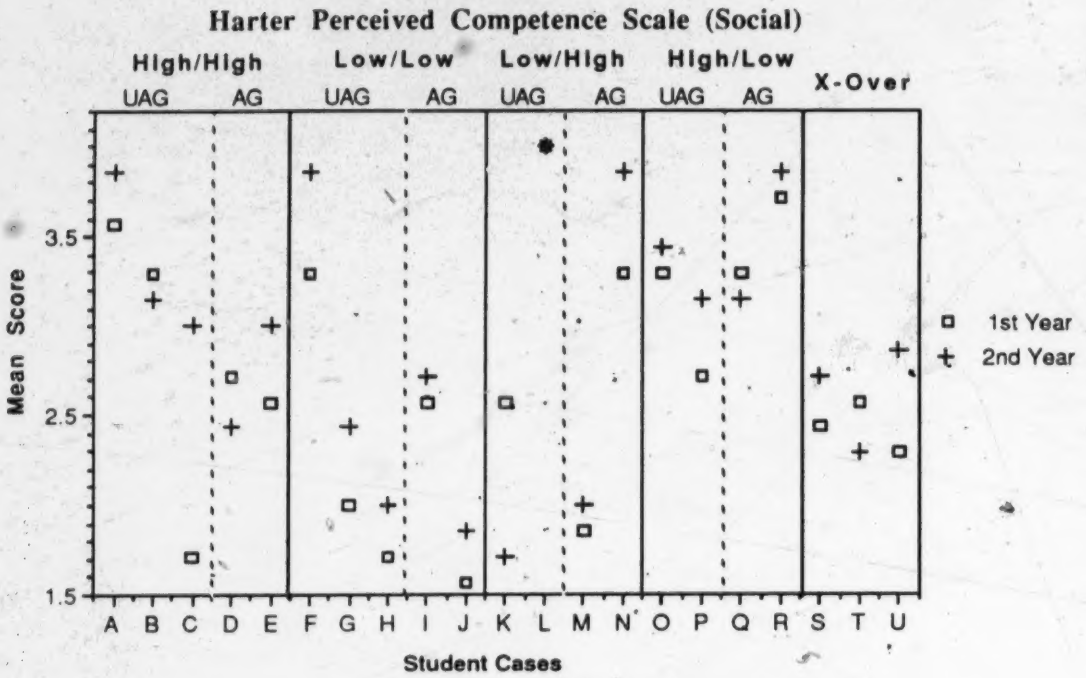


Figure 14

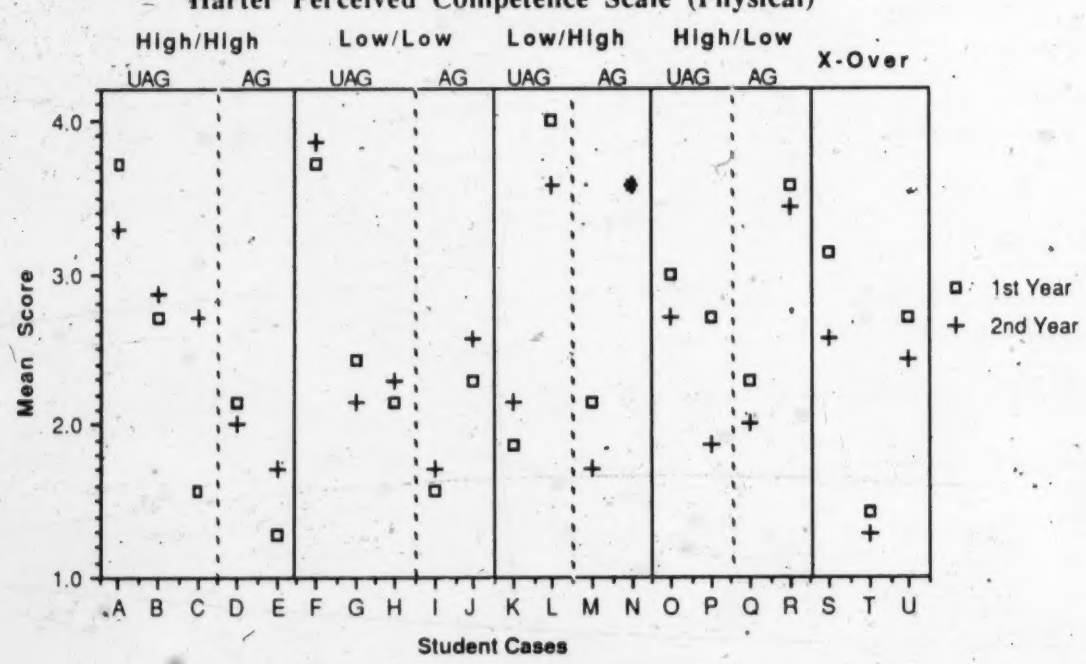
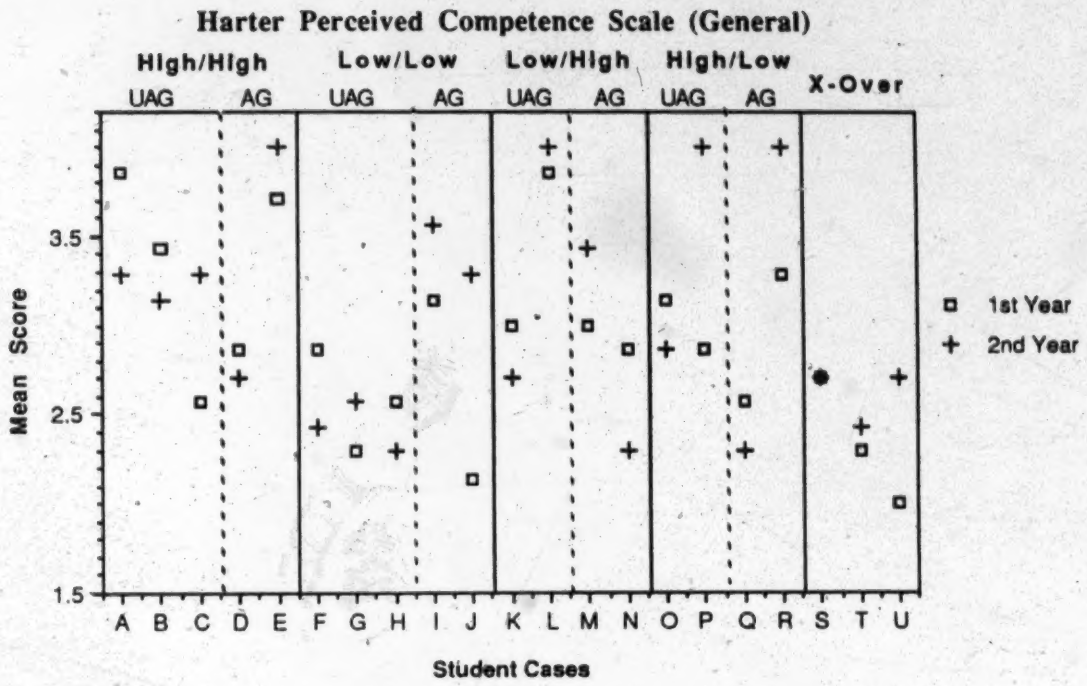


Figure 15



Crandall's Intellectual Achievement Responsibility Questionnaire

Crandall's Intellectual Achievement Responsibility Questionnaire is used to assess the intrinsic locus of control of students. Intrinsic locus of control is the individual's belief that outcomes are contingent on one's own behaviour. Students check one of two possible answers for each of the 34 items. One response would indicate internal locus of control while the other would indicate an external locus of control. The total number of internal locus of control responses are recorded in Figure 16. The median score on Crandall's Intellectual Achievement Responsibility Questionnaire is eighteen. All but one of the students tested were at or above the median. Their scores indicate that both underachieving and achieving gifted students assume responsibility for outcomes in academic situations (see Figure 16).

(1) The profiles of the underachieving and achieving gifted students were similar except for the fact that the underachievers tended to have a wider spread of scores in each motive/strategy group.

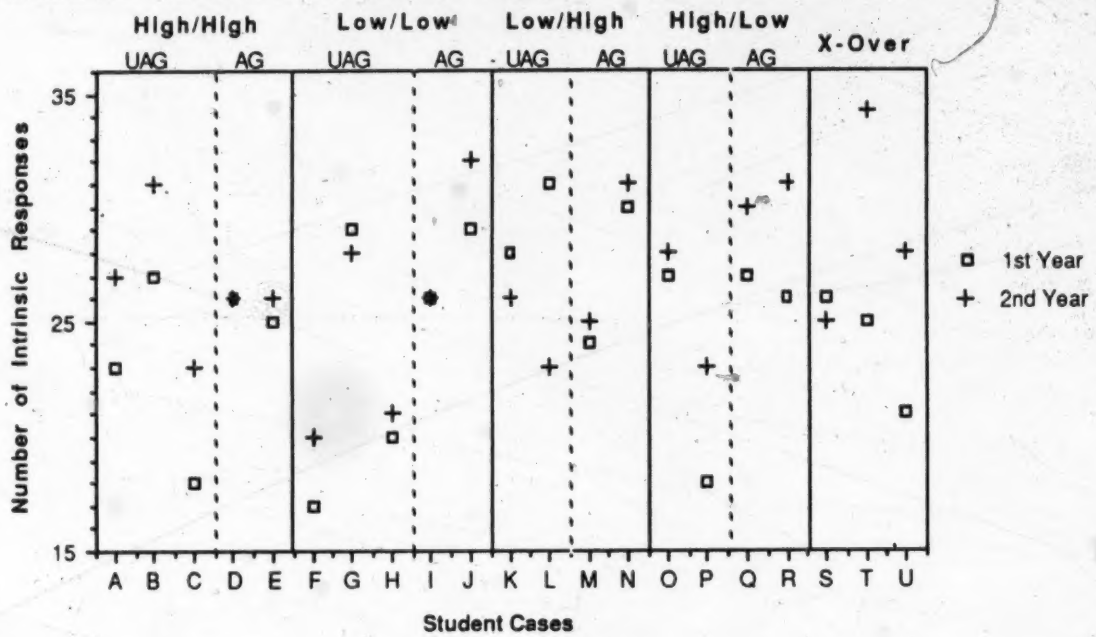
(2) No consistent pattern for motivations or strategies was detected.

(3) There was a general trend of an increase in intrinsic scores in the second year. The largest changes in scores occurred in the underachieving and cross-over groups.

(4) Cases C, P, T, and U demonstrated considerable increases while Case L had a noticeable decrease in the second year.

Figure 16

Crandall's Intellectual Achievement Responsibility Questionnaire (Intrinsic)



Scale of Intrinsic Versus Extrinsic Orientation in the Classroom (second year)

The Self-Report Scale of Intrinsic Versus Extrinsic Orientation addresses the question of what motivates a child to learn. This test attempts to identify the possible

components of intrinsic motivation in a self-reporting format that is psychologically meaningful to children and psychometrically sound. The scale ranges from intrinsic to extrinsic with intrinsic propensities represented by the higher numbers. Five areas are examined; preference for challenge versus preference for easy work (challenge), curiosity/interest versus teacher approval (curiosity/interest), independent mastery versus dependence on the teacher (independent mastery), independent judgment versus reliance on teacher's judgment (independent judgement), and internal versus external criteria for success/failure (internal criteria). Six questions are posed for each of the five subscales. Students respond using a four point scale with the larger number representing the higher intrinsic orientation in the classroom. The total possible score for each subscale is 24. Scores are interpreted through examination of individual profiles or through viewing the relationships of the individual to the group.

Norms for gifted students on the Self-Report Scale of Intrinsic Versus Extrinsic Orientation were unavailable. Both gifted underachievers and achievers scored above the mean of the test when using the score of each of the five subtests. On the basis of the high scores, underachievers and achievers appear to have an above average intrinsic locus of control relative to the general population. This assumption is supported by the findings reported by McClelland (1987) and the results from the Crandall's Intellectual Achievement Responsibility Questionnaire.

(1) In general, the scores of underachieving and achieving gifted students tended to be similar on the five subscales (see Figures 17, 18, 19, 20, and 21). There were, however, some interesting exceptions. The underachieving students in the low/low group had higher scores than the achieving students on the Independent Mastery subtest (Figure 19), but in the low/high group the underachievers scored lower than the achievers on the Curiosity/Interest (Figure 18), Independent Mastery (Figure 19), and Independent Judgement (Figure 20).

(2) Those students in a high motivation group (high/high or high/low), whether in the underachieving or achieving gifted category, tended to score higher on the Challenge (Figure 17), Curiosity/Interest (Figure 18), and Independent Mastery (Figure 19) than students in low motivation groups (low/high or low/high).

(3) This test was used only in the second year and no changes are available.

(4) The highest scores possible were received by C and E on Challenge (Figure 17), E, P, and R on Curiosity/Interest (Figure 18), E and R on Independent Mastery (Figure 19), and P and R on Internal Criteria (Figure 21). All these students were in the high motivation/high or low strategy groups.

The lowest scores were received by A and T on Challenge (Figure 17), H and K on Curiosity/Interest (Figure 18), and I and K on Independent Mastery (Figure 19). All these students were in the low motivation groups except Case A. Case A, however, was noted to have changed from high motives to low motives in the second year of testing. There were no extreme scores on independent judgment (see Figure 20).

Figure 17

Intrinsic Versus Extrinsic Orientations (Challenge)

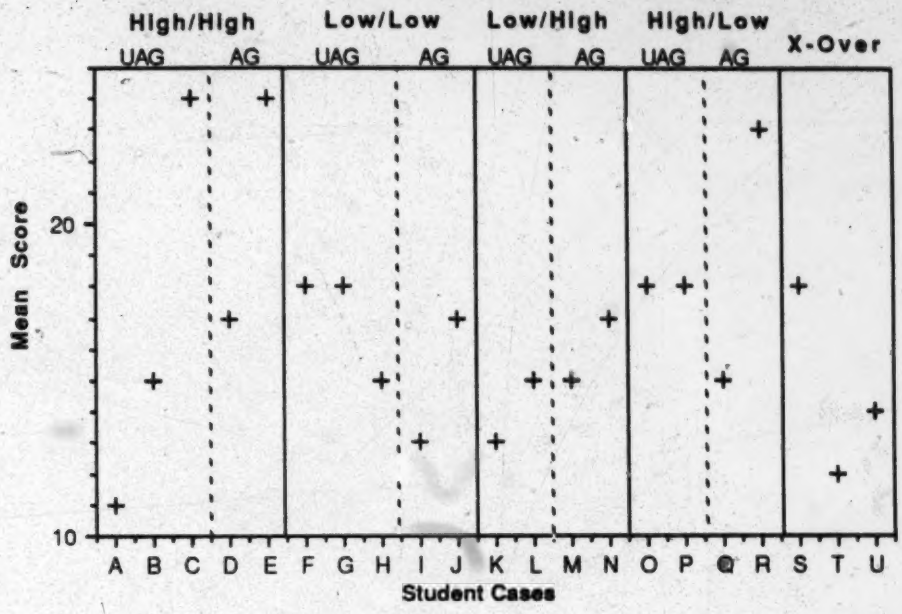


Figure 18

Intrinsic Versus Extrinsic Orientations (Curiosity/Interest)

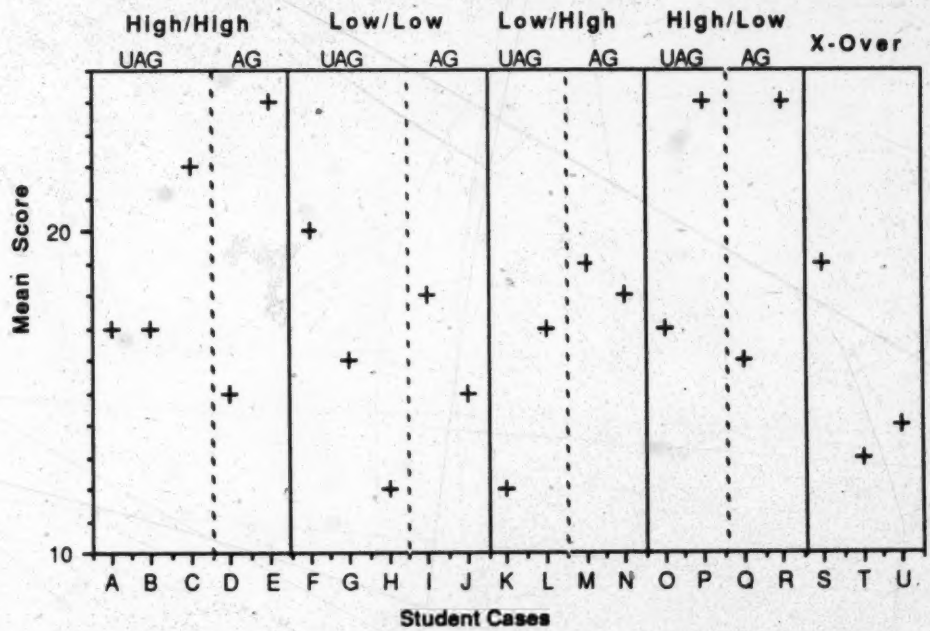


Figure 19

Intrinsic Versus Extrinsic Orientations (Independent Mastery)

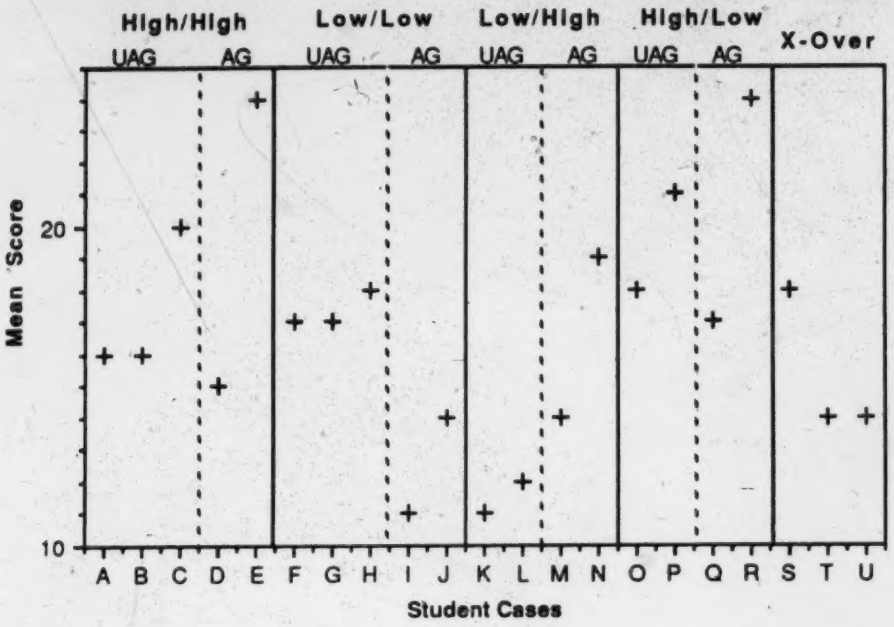


Figure 20

Intrinsic Versus Extrinsic Orientations (Independent Judgment)

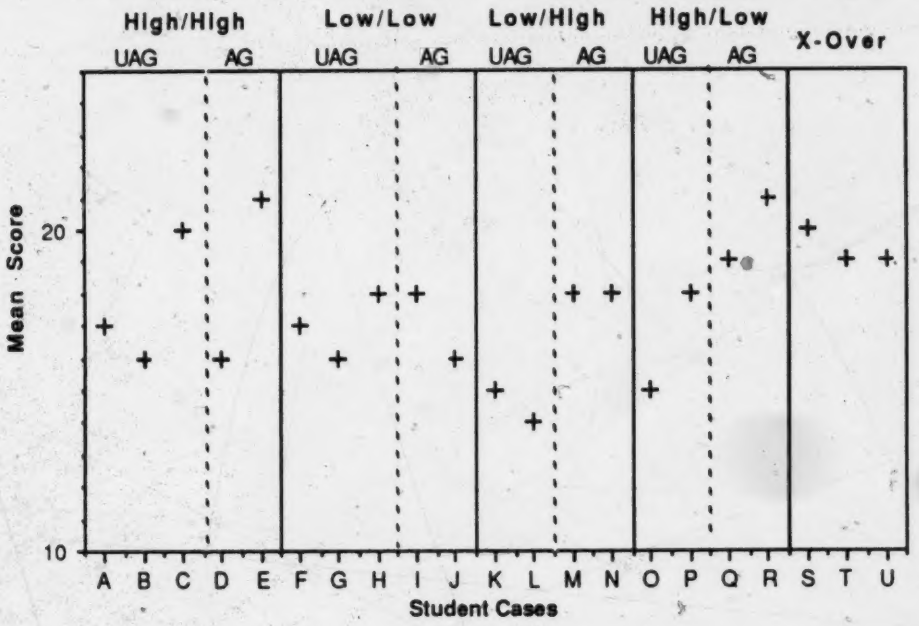
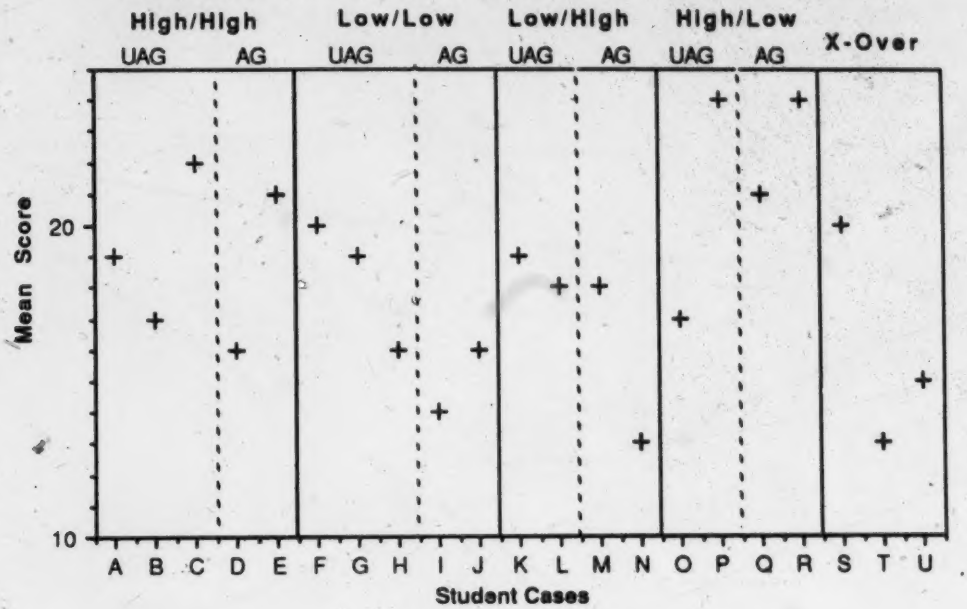


Figure 21

Intrinsic Versus Extrinsic Orientations (Internal Criteria)



Results of Strategy Measurements

Cornell Critical Thinking Test (first & second year data)

Analysis of the Cornell Critical Thinking Test is accomplished by using the total score from the four subtests. A total score of 71 is possible if students respond correctly to all questions. To discourage guessing, incorrect responses are penalized by subtracting the number of incorrect responses from the number of correct responses.

(1) No differences were noted between underachieving and achieving gifted students within each group on the Cornell Critical Thinking Test (see Figure 22).

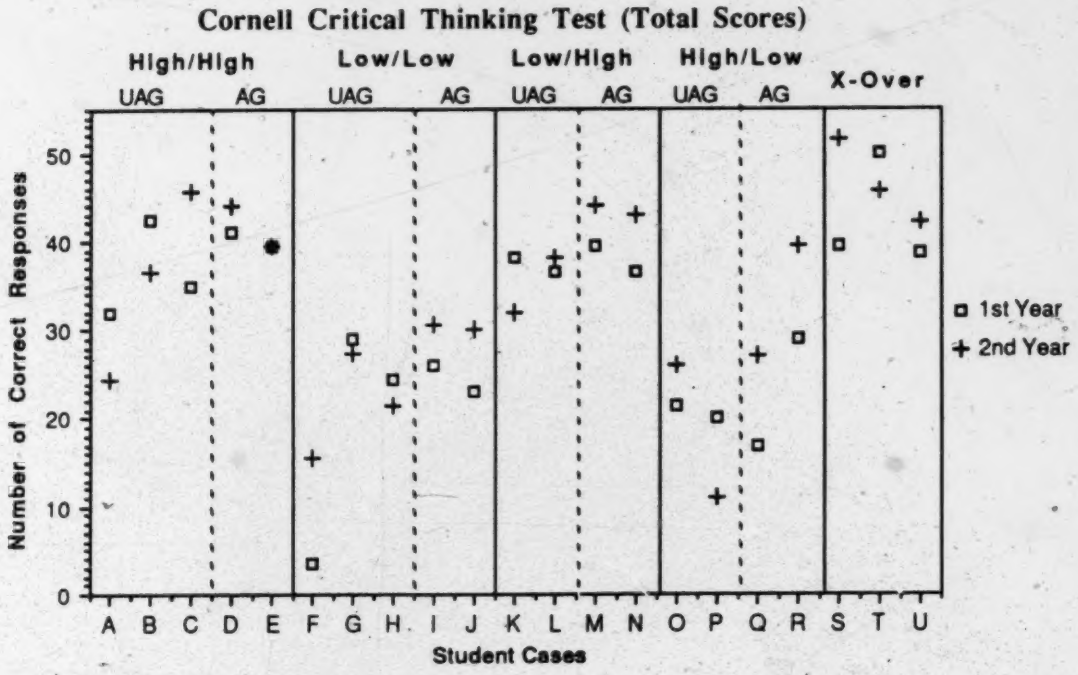
(2) Students with high strategy tended to score higher than those with low strategy irrespective of motivation.

(3) A grade effect (MANOVA) was noted on this test and all students would be expected to have an increase in scores on the second year. While the scores of achieving

gifted students tended to increase, the scores of underachieving gifted students tended to decrease.

(4) Cases F, Q, R, and S improved in the second year of testing. As a group, the cross-over students obtained the highest scores on this test.

Figure 22



Paris Reading Awareness Questionnaire (first & second year data)

The Paris Reading Awareness Questionnaire contains 22 multiple choice questions with three possible responses for each question. The choices the students make are valued at zero, one, or two points according to the appropriateness of the reading strategy. The possible range of scores is between zero and 44 points for each student, with a higher score indicating superior strategy. Although norms for the gifted population are not presently available, the students' scores on the Paris Reading Awareness Questionnaire are generally bunched at the high end of possible scores for this test (see Figure 23).

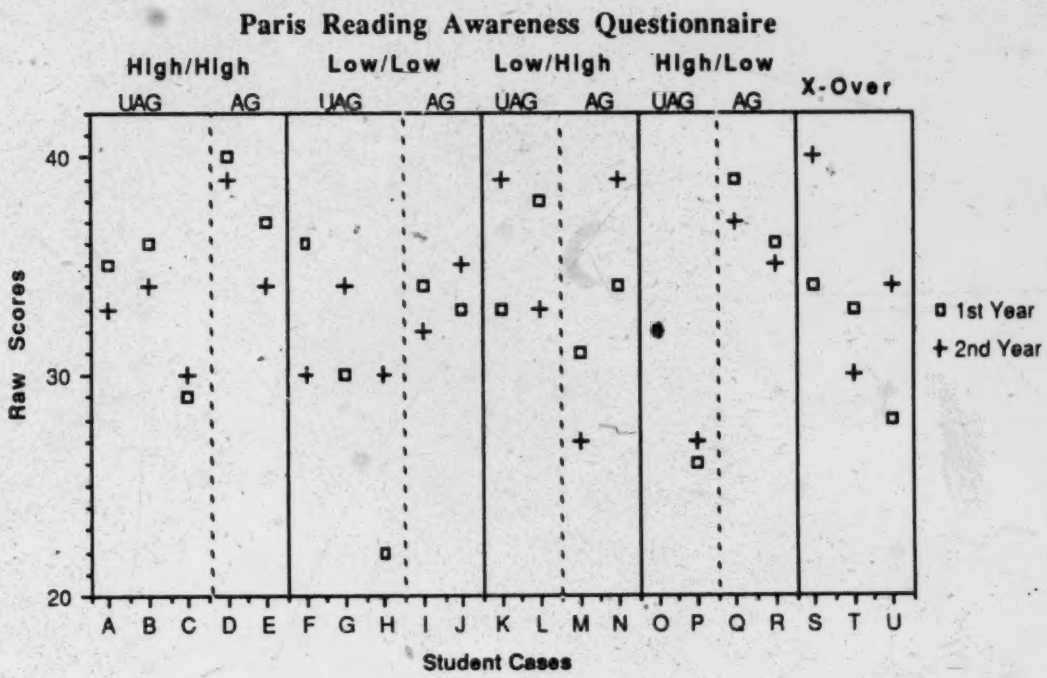
(1) In the high/low group the achieving students had higher scores than their underachieving counterparts. Otherwise, there were no obvious differences between the underachieving and achieving gifted students.

(2) There were no obvious differences between the motive/strategy groups.

(3) There was some variation in scores over the two years with scores for achievers tending to go down in the second year and those of underachievers equally likely to go either up or down.

(4) The score of Case H was low, with respect to the other students, during the first year of testing but within the bunch on the second year of testing. Considerable increase in score was obtained by Cases S and U from the cross-over group.

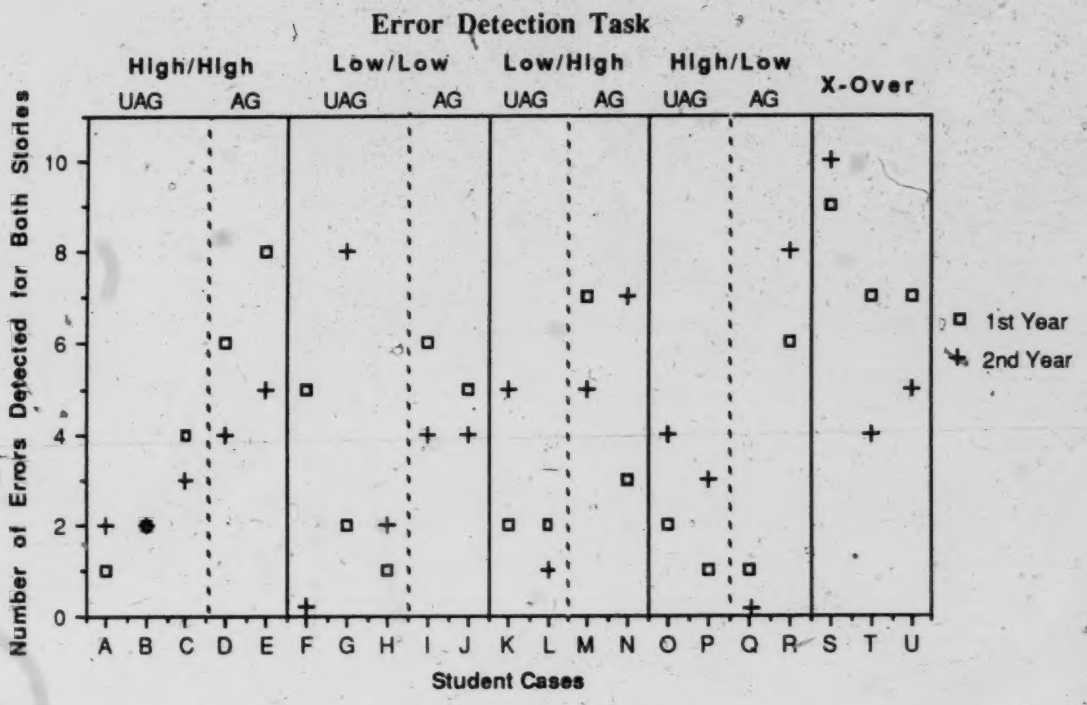
Figure 23



Error Detection Task

Students are provided with two stories and asked to underline anything in the stories which does not make sense to them. Each story contains three incongruous words and three scrambled sentences. The total possible score if all errors are detected in both stories is twelve points. The individual's score on the Error Detection Task is the sum of the errors detected by the student A higher score indicates a greater number of errors detected.

Figure 24



(1) There is a general trend for the achieving students to score higher than the underachieving students (see Figure 24).

(2) No apparent pattern was noted on the scores of either the high or low strategy students in either year.

(3) The scores of achievers tended to decrease on the second year of testing while the scores of the underachievers tended to increase.

(4) Cases F and G demonstrated the greatest variation in their scores. The variation was consistent with their performance on the Coopersmith's Self-Esteem Inventory in that F demonstrated a large decrease while G showed a great increase in score.

In the cross-over group, Case S who has a high/high profile had the highest score while Cases T and U both experienced a decrease in their second year scores despite having high strategy.

Vygotsky Blocks

The purpose in using the Vygotsky Blocks was to determine whether any one student or group of students had a significant developmental lag in concept formation (Yu, 1981). All students were able to accomplish the task in less than twenty-one moves which indicates that both gifted underachievers and achievers represent a homogeneity in intellectual development, having attained the conceptual thinking level, utilizing true concepts, and demonstrating the use of higher cognitive processing mediated through language. The range of the number of attempts required to obtain the solution varied from one to seventeen (see Figure 25). Since all students completed the task and used a limited number of reversions, guesses, and uncommon attempts, only the number of attempts has been reported.

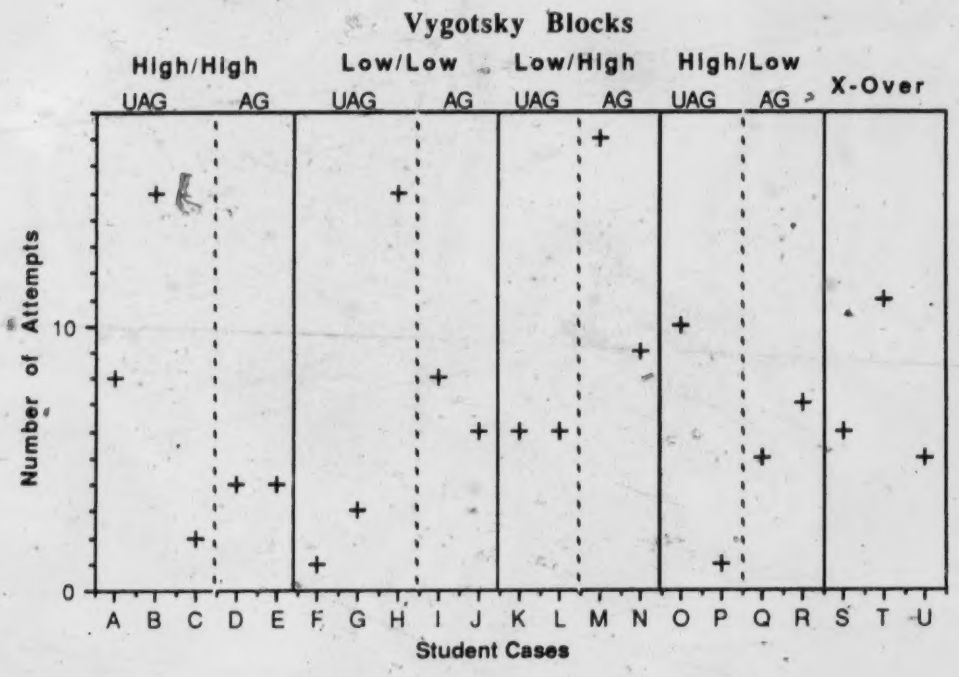
(1) Except for Case M, all the achievers were generally clustered together. There was, however, greater variation in the number of attempts required by the underachievers. The underachieving gifted students had the four lowest scores, indicating the least number of attempts to solve the problem, and two of the three highest scores. The cross-over students were within the cluster area of the achieving students

(2) No differences were observed between the strategy groupings.

(3) This test was administered in the second year only.

(4) All students were able to accomplish the task and therefore no individual student stands out.

Figure 25



Results of Interaction Between Motivation and Strategies Measurements

Learning Process Questionnaire (Revised for Junior High)

The Learning Process Questionnaire is comprised of 36 items scored by summing responses on the 5-point Likert scale. There are six scores corresponding to the student's degree of surface, achieving, and deep motives and surface, achieving, and deep strategies. Raw scores are converted to high, middle, and low subscales. The subscales are then matched to characteristic profile patterns (Biggs, 1987; Entwistle, 1981; Schmeck, 1983).

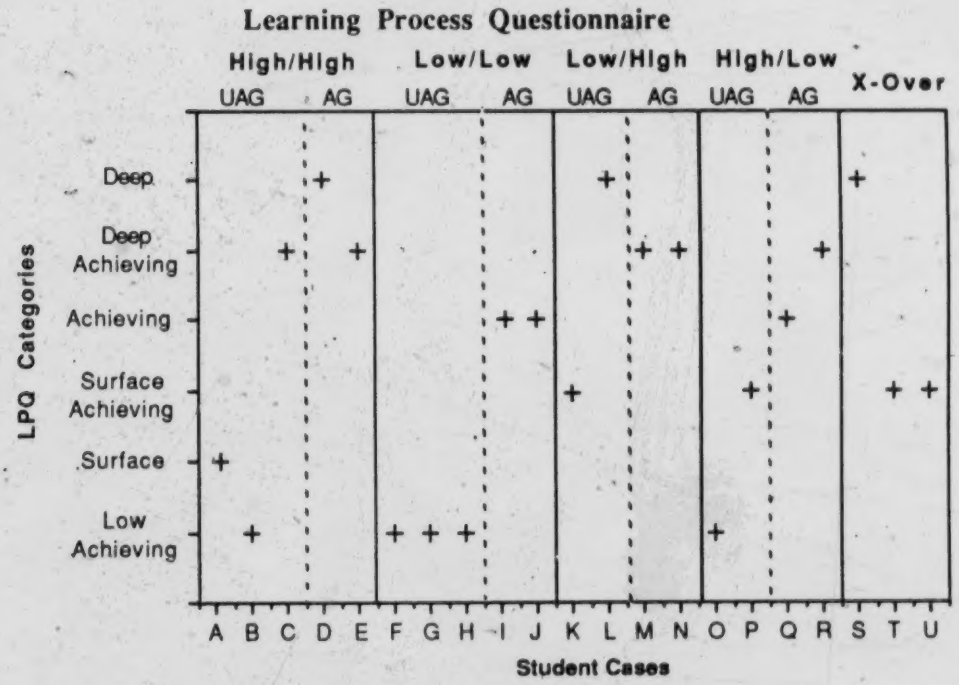
(1) As predicted in the model, the achieving gifted students were in the deep, deep-achieving, or achieving categories (see Figure 26). The underachieving gifted students were in the surface-achieving, surface, or low-achieving categories with the

exception of Case C who was in the deep-achieving category and Case L who was in the deep category. Case C had recently taken an interest in academic pursuits which might explain the discrepancy in his category. Case L was experiencing conflict between his personal goals and the goals of the institution.

(2) The highest scores tended to be associated with high strategies irrespective of achievement (Cases D, L, and S). The lowest scores were associated with low strategies and underachievement (Cases B, F, G, H, and O), although Case B had changed from high strategies during the first year to low strategies in the second year.

(3) This questionnaire was administered only in the second year.

Figure 26



(4) The students in the cross-over group comprise a unique group who did not exhibit a consistent pattern according to this model. Case S was a high/high and had a score consistent with the achievers in the high/high group. Case T, although classified as

an achiever on the basis of the first year results, and Case U were in the low/high group and were consistent with the underachieving students in the surface-achieving category.

Summary of Test Results

The trends summarized in this section occurred with some consistency over a number of subtests or were fairly evident from the charts.

(1) There was no clear pattern of differences noted between the underachieving and achieving gifted students within each motive/strategy group although the underachievers did tend to have a wider spread of test scores than the achievers perhaps indicating a less homogeneous group. A definite difference in the approach to learning was noted, however, in the Learning Process Questionnaire. With no exceptions achieving gifted students were deep, deep-achieving, or achieving. With one exception (Case L) all underachievers were surface-achieving, surface, or low-achieving.

(2) On the motivational measures, high motivation was associated with high scores on the tests while low motivation was associated with low scores regardless of the strategy grouping. Similarly, on the strategy measures, high strategy was associated with high scores and low strategy with low scores irrespective of motivational grouping. The extreme high scores on the Learning Process Questionnaire (interaction between motivation and strategy) were associated with high strategies irrespective of achievement. The extreme low scores, however, were associated with both underachievement and low strategies.

(3) Scores were generally consistent over the two years of testing. Explanation for some of the changes in scores might have been a function of regression toward the mean. Underachievers tended to demonstrate the largest changes in scores. Students in the cross-over group also tended to have a wider range of scores. The Cornell Critical Thinking Test is of particular interest since a grade effect (on the basis of the MANOVA) would have predicted a general increase in all students' scores. While the scores of

achieving gifted students tended to increase as expected, the scores of underachieving gifted students tended to decrease.

(4) The following nine students were notable because of their unique profiles. Cases A, B, and C were in the high/high underachieving group and might be best characterized by the term change. Case A changed from high/high in the first year to low/high in the second. Case B changed from high/high to low/low. Although Case C remained high/high many of his scores increased in the second year. Case C demonstrated increases on the Coopersmith Self-Esteem Inventory and Harter Perceived Scale of Competence social subscales as well as on the Harter Perceived Scale of Competence physical and general subscales, the Crandall Intellectual Achievement Questionnaire, and the Intrinsic and Extrinsic Orientation in the Classroom challenge subscale.

Cases F and H were in the low/low underachieving group. Case F showed the greatest decrease on the Error Detection Task over the two years as well as a decrease on the Coopersmith Self-Esteem Inventory school, home, general, and total subscales. Case H received very low scores on the Coopersmith Self-Esteem Inventory and the Harter Perceived Scale of Competence, and low scores on the Intrinsic and Extrinsic Orientation in the Classroom curiosity/interest subscale and the Paris Reading Awareness Questionnaire.

Case L was in the low/high underachieving group. Although Case L had a decrease on the Crandall Intellectual Achievement Questionnaire during the second year of testing, the learning approach of this underachieving student was deep.

None of the underachieving students in the high/low group were notable.

Cases S, T, and U were in the cross-over group Case S was a deep processor moving from achievement to underachievement. This student demonstrated increases on both the Paris Reading Awareness Questionnaire and the Cornell Critical Thinking Test during the second year. Case T was a surface achiever moving from achievement to underachievement who scored lower on the challenge and internal criteria sections of the Intrinsic and Extrinsic Orientation in the Classroom but showed an increase on the Crandall

Intellectual Achievement Questionnaire during the second year of testing. Case U was also a surface-achiever but was moving from underachiever to achiever. This student demonstrated an increase on the Paris Reading Awareness Questionnaire and the Crandall Intellectual Achievement Questionnaire.

Semi-Structured Interview Case Studies

A profile of underachieving and achieving gifted students has been developed using highlights and themes from the twenty-one interviews. In order to ensure anonymity, some identifying material has been disguised; however, the content has not been altered. Further details from the semi-structured interviews are available in Appendix B. These students were selected from the total group to represent various profiles of achievement and underachievement that were obtained through the first year's analysis of significant motivational and strategy factors. Although other students could have been selected for inclusion in the second year testing and interviews, these particular students appeared to be a valid convenience sample of individuals in their respective categories, meeting the criteria for inclusion and presenting a clear profile.

High motivation and high strategy.

Underachievers.

Case A, Female: Case A found school boring but emphasized her social life and relationship with friends. She hoped that future grades would be more interesting. Her motivation in school stemmed from a desire to learn and to make something of her life. Although a student with high motivation and good strategies in the first year, Case A's current emphasis on social life has resulted in a change in academic motives and strategies.

Case B, Male: Case B did not find school to be enjoyable and was motivated to work by the thought of what would happen to him if he did not do what was expected. He

had equated learning with tasks and activities and would rather be doing things he perceived as enjoyable such as spending time with friends, building models, watching TV, and reading. The change from high to low motivation had apparently resulted from a perception of school as tedious and extra-curricular activities as more satisfying.

Case C. Male: Case C reported school to be a challenge and expressed great interest in learning. He was concerned about his marks and found that although he knew he would do well, he experienced high anxiety before exams and before marks were released. The desire to succeed in school was a new experience resulting from an emotional event (near-death of Grandfather). Case C does not want to disappoint anyone. He desired to continue his education into university, possibly in the area of law or science. He was an extremely interesting subject on account of his giftedness and his desire. Case C appears to be in the process of rallying from underachievement to an achieving level of academic functioning.

Summary: This group represented the greatest degree of change in academic performance, motives and/or strategies. In Cases A and B a decreased motivation in school and an increased emphasis on friends and activities were detected. In Case C the expressed disappointment of a grandfather (significant other) resulted in increased academic performance and a shift from underachievement toward achievement. Confirmation of a change from underachievement to achievement status would not be possible until the following year's discrepancy results on the C.T.B.S. and Lorge-Thorndike are available.

Because of the incongruence between high motivation, high strategy and underachievement, this group might well be an artifact arising from a process of transition which the students are undergoing. This group, therefore, might not be a distinct and consistent category, but rather might result from the testing of students who are in transition.

Achievers.

Case D. Female: Case D was a mature, fun loving, student who was motivated to learn. She reported that school was boring since material was generally too easy except for the pull-out gifted program. Case D would often engage in activities for the learning experience and not the external reward. Her school marks in core subjects were in the 90's. She described her ability to learn as a "process similar to osmosis," occurring without a high degree of effort or hard work. Her motivation in school stemmed from external sources such as friends and parents as well as from an internal desire to learn.

Case E. Male: Case E enjoyed learning but at times found school to be boring when he was not allowed to progress further. He appreciated being in a gifted pull-out program. Case E was motivated by marks and concern about careers. He reported that the most important thing about school for him was to learn things. Case E's approach to new activities demonstrated good use of strategies. When presented with a new task he would first examine the material, then record the facts that he knew about the subject, attempt to work the problems out and if he was still unable to proceed he would seek further information through such avenues as books or resource people before trying again.

Summary: The two students interviewed from the high motivation and high strategy achieving gifted group reported that school was easy and they wanted to learn, but that school, for the most part, was boring. They did appreciate being in a gifted pull-out program. The students were motivated by a concern about future careers, external encouragement from friends and family, and from an internal desire to learn.

Low motivation and low strategy.

Underachievers.

Case F. Female: Case F reported to be having learning difficulties in the area of attention and memory. She expressed frustration at being smart in some areas of school but not receiving good grades. Case F had sought the help of friends to help her overcome some of her difficulties. The low motivation and low strategies might be the result of these difficulties.

Case G. Female: Case G had evaluated her current level of performance in school and determined that to improve her marks would take more time and restrict the outside activities she enjoys. Although she had been told that higher marks could mean better jobs in the future, this was not adequate motivation for the present. Case G preferred to meet the minimum requirements that would enable her to pursue her goals.

Case H. Male: Case H was a student with a difficult family life that appeared to affect his academic performance. He desired to remove himself from the situation but could not visualize a means other than through escape literature or becoming a jet pilot. He did not appear to utilize appropriate strategies for academic tasks but rather when faced with a new task would take "about five minutes to think about it and then I just do whatever I think to do."

Summary: The students in this group were representative of the largest number of underachieving students in one group which might also represent the greatest diversity amongst subjects in a single group. Of the three students interviewed, Case F was a student with potential learning deficits who received mixed messages of precocity and obtuseness on her academic ability in school. Case G was a creative individual who did not value higher marks at the expense of restrictions on outside activities. Case H

presented a dysfunctional family background and exhibited a poor prognosis for completing school unless appropriate interventions were initiated. This group might encompass the extreme cases which have been identified in current research on underachieving giftedness.

Achievers.

Case I. Female: Case I found school boring and maintained a balance between those activities at school she expressed as boring and her fun activities undertaken after school. Her motivation in school stemmed from a desire to become a veterinarian. Although a student with low motivation and strategies, Case I was able to maintain a balance between academic areas which she described as boring and her outside activities which she viewed as enjoyable. Case I's intelligence and delicate balance, thus far, had enabled her to be successful in school without being highly motivated or utilizing effective strategies. Although school was boring for Case I she expressed that at times you "have to discipline yourself even though you don't want to do it sometimes."

Case J. Male: Case J typified the achieving student who was interested in being a model student. In so doing he was prone to alienate himself from his peers. He was not satisfied with school and described his primary motivation in school to be "thinking about what I can do when I get home at the end of the day." His strategies were predominantly at a level of guessing what the person in authority desired and replicating what was expected. Case J appeared to be a 'model student' whose motivation and strategies were directed toward succeeding in the system rather than to an enjoyment of the learning experience.

Summary: The two students interviewed in this group indicated that school was boring and that after school activities were preferred. Marks were considered to be important to gain future occupational goals and for the external rewards offered to the "model" student. Despite being considered to be performing successfully in school, these students did not

enjoy learning and employed strategies useful for succeeding in the system but not necessarily useful for promoting learning.

Low motivation and high strategy.

Underachievers.

Case K. Female: Case K described herself as a closed person, although she would have liked to be more open. She had emotional problems with her family, particularly in comparing herself with her step-sister whom she perceived as being able to do no wrong. In contrast she perceived herself as being able to do no right. Case K reported problems remembering things presented visually and problems with written expression. Her primary motivation in school was the knowledge that she was able to return home at the end of the day. Case K found school and life in general to be boring and lacking in freedom.

Case L. Male: Case L's desire to learn appeared to interfere with his marks. He was able to present strategies for improving his academic standing through activities such as spending more time on his homework and concentrating on school material but until his marks decreased substantially he would rather continue in his private interest areas. Case L was motivated from a desire to learn and to obtain a better education. He had excellent strategies for approaching tasks but did not always perceive school to be in keeping with his education.

Summary: The two students interviewed from this group did not perceive school as an important part of one's education. Although they had appropriate strategies for learning, these strategies were not applied to school tasks. There were too many distractions from family or personal interests outside of the school for school to be sufficiently meaningful to merit the effort necessary for improved marks.

Achievers.

Case M. Female: Case M generally found school to be easy and was motivated to learn through her outside reading. School was a means to a further education in a field of her interest. She was a mature individual who had excellent strategies for coping with school tasks. Case M was also a student who had thought of deeper issues such as the purpose and meaning of life and world events. She desired to eventually be able to obtain a "good" job and viewed education as an important step to that goal.

Case N. Male: Case N had little difficulty with school. He quickly assessed situations and applied appropriate strategies for academic success. When his marks went down last year he reported that "then I finally caught on and I raised them up. I finally started listening." Since school did not present a challenge for Case N he reported his motivation in academics was to "just keep going" and his desire to make his parents proud of him. He strove for high marks, enjoyed learning and had been able to achieve in school despite finding school to be an unstimulating environment.

Summary: The two students interviewed from this group considered school work to be easy and unmotivating. Outside school activities formed a rich source of educational opportunities in many areas. They were able to compensate for low school motivation by using excellent strategies, possibly developed outside of school, for promoting learning in school. School was viewed only as an important means to an end.

High motivation and low strategy.

Underachievers.

Case O. Female: Case O was a student who was satisfied with her performance. She was motivated to work at academics by the marks she received, since after "I get low marks I have to work harder." Case O was dependent on others to provide answers and to help

her work at school. She reported her primary motivation was from her parents' encouragement to work. She was a student who would continue to do well in school but did not have the desire to change her achieving strategies to emphasize learning. Case O was content to continue as she was doing in school and to have "fun".

Case P, Male: Case P considered obtaining good grades and his future occupation as the main motivators in his education. He was young for his grade and of small statue, having skipped a grade, and this appeared to have hindered his progress and relationships with his peers. He was highly competitive but did not always appear to use the best strategies in the given situation. What he lacked in strategies he attempted to compensate by perseverance. Unfortunately for Case P school appeared to "get harder every year."

Summary: The two students interviewed from this group appeared to be dependent on others to assist them with their work. They also utilized strategies that were more in keeping with tactics (short term manoeuvres that are conducted like orders). The high motivation and low strategy group underachievers appeared to have the desire to learn but failed to utilize appropriate strategies to promote effective learning.

Achievers.

Case Q, Female: Case Q was a carefree individual who was very creative. She placed high value on her friends and had friends with whom she competed for marks in school. Her competitive nature in this area appeared to compensate for inefficient strategies. Case Q expressed that normally she would do "a minimum amount of work that needed to be done and then quit." The contemplation of her future and the contests between herself and her friends kept her motivated and achieving in school.

Case R, Male: Case R was highly motivated to learn and used strategies effectively to solve problems. His strategies were not always appreciated in school since his desire to

learn was often in conflict with the expected performance of students. Nevertheless he was able to achieve to a satisfactory level. Case R would be described as a deep thinking student who questioned his surroundings and stepped forth to discover the answers.

Summary: The two students interviewed from this group were unique individuals whose creativity and deep processing approach tended to be at odds with the expectations of the school tasks. In spite of this dissonance, they were able to apply their own distinctive style to school tasks and still exceed the requirements imposed upon them by the school system.

Cross-over on achievement and underachievement.

Achieving to underachieving.

Case S. Female: Case S anticipated continuing after high school into university, possibly in the area of law, politics, or business. She expressed the desire for more freedom to be able to do anything she might want to do. Case S also expressed a frustration with the pressure from her parents to excel. She presented appropriate strategies to improve her marks but reported that she had no desire to use these activities. Case S expressed concern that she did not "want to get really high grades because then my parents would probably ship me off to a special school." Consequently she did not desire to spend more time studying and improving her marks. Case S was quite content to continue at her present level with possible improvement in high school when she perceived marks would be more important. She reacted negatively when people were "constantly telling me that I can do better." She was not achieving to her expected level, but Case S was satisfied with her current level of performance and felt in control of the situation.

Case T. Male: Case T was a student who was satisfied with his current level of performance and dissatisfied with what school offered. He described his younger school

years as "in grade 6 and grade 7, I was a model student, I was a perfect little Johnny, like I'm sure some teachers expected me to put an apple on their desk one day or something." Case T viewed school as a necessity for future positions and not as a stimulating environment for learning. Case T was a logical thinker who considered the future and formulated long-range plans. He had determined that grade nine was not all that important in the total scheme of his education. Case T expressed the feeling that he was in control and "can do almost anything I want with my life."

Summary: These were the only two to cross-over from achieving to underachieving. In both cases they were able to clearly delineate the reasons why they changed their performance and to predict a return to achieving status at a 'crucial' point in their education. This continues to support the findings of underachievers perceiving themselves to be in control (internal locus of control).

Underachieving to achieving.

Case U. Male: Case U mentioned that if he did not appreciate the teachers he would not do much for them. This year he reported that his marks were better than last year and he felt that his relationship with teachers had improved. He reported that school this year was "a bit nicer than last year." Case U reported his primary motivation in school stemmed from his parents' pressure and his desire to pass. He was able to express appropriate strategies for improving his marks and believed he could improve them at any time. Case U's academic success, however, was influenced by his interest in the materials, instructional presentation, and teachers.

Summary: There was only one student to cross-over from underachieving to achieving, although, Case C might also be considered a cross-over in transition.

Summary of interviews.

All students described attainable goals and believed they would be able to attain the profession they were considering. None of the students interviewed expressed a fear of failure although for some students, particularly those in the achievers category, failure was perceived as not making the honor role.

Two of the eleven underachieving gifted students came from less than ideal family backgrounds. These two students were the only children who expressed a desire to enter professions that involved travel, a jet pilot and a stewardess. All other students reported that the family background was stable and functional. They also reported an interest in professions that would require university preparation.

Although the underachieving gifted students were expected to be using defenses such as school is boring or projecting blame on teachers (Rimm, 1986), all achieving gifted and most of the underachieving gifted students reported school to be boring or unstimulating. Similarly, both the achieving gifted and underachieving gifted students recognized that teachers could improve the situation but did not place their educational outcomes at the control of their teachers. Virtually all students felt themselves to be in control. This internal locus of control emerged not only in the interviews but also in the quantitative analysis of Crandall's Intellectual Achievement Questionnaire and the Self-Report Scale of Intrinsic Versus Extrinsic Orientation in the Classroom. Gifted students generally reported a personal control over their educational success whether achieving or underachieving (McClelland, 1987).

Underachievement appeared to be closely related to the reaction of the student to the "boring" environment of school. Although most students, both achieving gifted and underachieving gifted, emphasized the importance of outside interests over their academic pursuits, the achieving gifted students exhibited a sense of "hanging in there" academically in order to achieve their future goals while the underachieving gifted students appeared to

be disengaging themselves from a system thought to be inappropriate either by "coasting in neutral" with plans to return to serious study when the marks would be important for attaining future goals or by utilizing a surface or low achieving approach at school. There appeared to be a larger number of surface strategies utilized, poorer study habits, and more disorganization among the underachieving gifted students who, nevertheless, expressed the belief that they could achieve to a higher standard if they were to work harder. Most underachievers admitted that their underachievement was the result of a lack of effort but were unwilling to exert the effort required to "solve the problem." In fact, most underachievers did not perceive that there was a problem. They were quite satisfied with their current level of achievement which, in the majority of cases, was at a pass or well above a pass. When their marks dropped below their accepted standard, they expressed a willingness and ability to exert the extra effort required to raise their average to their accepted standard (see Table 20).

Table 20

Summary of Interviews

Motives/ Strategies	Underachievers	Achievers
High/High	-Case A [Friends extremely important, school boring, change in second year to low motives/low strategies]	-Case D [Motivated by friends & parents and career, finds school very easy, school is boring]
	-Case B [Dislikes activities at school, school is boring, change in second year in motives and strategies]	-Case E [Motivated by marks and career, school is boring]
High/High	-Case C [In a transition to achiever gifted, change resulting from emotional event]	

➡➡➡➡

Low/Low	-Case F [Mixed profile, learning difficulties] -Case G [Weights more time at school work versus activities outside school, school is boring] -Case H [Difficult home situation]	-Case I [Finds school easy, very creative individual, school is boring] -Case J [Strives to be a model student, school is boring]
Low/High	-Case K [Mixed profile, learning difficulties and emotional problems, school is boring] -Case L [Interests primarily outside of school, school is boring]	-Case M [Finds school easy, perceives school as a means to an end, school is boring] -Case N [Finds school easy, motived for marks, school is boring]
High/Low	-Case O [Satisfied with current level of performance, school is boring] -Case P [Young for grade promoted from grade one to three, high emphasis on marks, hard worker, school is difficult]	-Case Q [Ambivalent toward school, very creative, motivated by competitive nature, school is boring] -Case R [Very motived to learn, deep thinker, believes school emphasizes facts and not learning]
Cross-Over	-Case U **Underachieving to Achieving** [Achievement level varies according to his interpersonal relations with teachers and his present interest in the subject, school is generally boring] ➡➡➡➡	-Case S **Achieving to Underachieving** [Avoiding performing well to prevent having to go to a special school, school is boring] ⬅⬅⬅⬅ -Case T **Achieving to Underachieving** [Mixed profile with surface motives and deep strategies, satisfied with current level and will work harder when it counts, school is boring] ⬅⬅⬅⬅

CHAPTER V

DISCUSSION

A. Introduction

The main purpose of this study was to examine the profile of the underachieving gifted student with respect to the achieving gifted student on motivational and strategy factors and to propose a possible model for future research on the underachieving gifted student. Accordingly the following questions were addressed:

(1) Do underachieving gifted students score lower on measures of motivation such as self-esteem, self-perception, and locus of control relative to gifted achievers?

(2) Do underachieving gifted students score lower on strategy measures such as critical thinking skills, reading strategies, and error monitoring skills relative to gifted achievers?

(3) Do motivation and strategy measures of underachieving gifted and achieving gifted students remain constant over grade levels?

(4) Is there one common profile or are there many profiles to describe the underachieving gifted population?

(5) How are motivation and strategy patterns similar and/or different between underachieving and achieving gifted students?

(6) Is there a model that can be applied to underachieving and achieving gifted students that will incorporate motivation and strategy factors?

(7) What are the underachieving and achieving gifted students' perceptions of the school as a milieu for academic achievement?

These questions will be discussed with reference to the data obtained from this study.

B. Summary of the Study

The study utilized both quantitative and qualitative analysis to answer the research questions. The data from the first year were analyzed quantitatively using a MANOVA. The results of this analysis formed the basis of the median split and the selection of the

second year sample of students. Data from the second year were analyzed qualitatively. The summary of the study is divided into the seven question areas of motivational factors, strategy factors, consistency over grade levels, common profile, patterns of motives and strategies between underachievers and achievers, the model, and students' school perceptions. Finally a summary of the implications of this study is presented.

Motivational Factors

(1) Do underachieving gifted students score lower on measures of motivation such as self-esteem, self-perception, and locus of control relative to gifted achievers?

Research has repeatedly demonstrated that giftedness is strongly linked with a powerful desire for self-advancement (Burks, Jensen, & Terman, 1930; Renzulli, 1978; Terman, 1925). Similarly Cox (1926) in a study on giftedness reported that geniuses distinguish themselves in their accomplishments and also in three personality traits: motive and effort, confidence in their abilities, and strength of character. Motivation appears to be closely connected to achievement.

Of the various motivational factors measured by Coopersmith's Self-Esteem Inventory, Harter's Scale of Perceived Competence, and Crandall's Intellectual Achievement Questionnaire in this study, the variables that initially differentiated underachieving and achieving gifted groups were school (Coopersmith) and cognitive (Harter). On both scales, achieving gifted students scored significantly higher than underachieving gifted students indicating that achieving gifted students appear to gain more of their esteem from the school environment and perceive themselves to be more competent cognitively than do underachieving gifted students (see Table 7). However, on all the other scales there were no differences between the achieving and underachieving gifted students indicating that as a group gifted students have similar self-perception, self-esteem, and generally perceive themselves to be in control. With the exception of school and cognitive

factors, underachieving gifted students did not differ from achieving gifted students on measures of motivation.

The results of the qualitative analysis in the second year generally confirmed that, on the whole, there were few differences between the underachieving and achieving gifted students in motivation. The qualitative analysis further indicated that the factors of motivation and strategy functioned independently of each other. On the motivational measures, membership in the high motivational groups was associated with high scores while membership in the low motivational groups was associated with low scores irrespective of strategy grouping or achievement level. Thus motivational factors, in themselves, were generally not associated with underachievement or achievement by gifted students. Results of the Scale of Intrinsic versus Extrinsic Orientation in the Classroom (see Figures 17, 18, 19, 20, and 21), administered only in the second year, also failed to differentiate between the underachieving and achieving gifted students within the motive/strategy groupings.

Although motivational measurements generally did not differentiate underachieving students from achieving students within the groups, the combination of motivational and strategy measurements within the same instrument (Learning Process Questionnaire) did indicate consistent differences between underachieving and achieving gifted students. Thus, a more profitable approach to differentiating underachieving from achieving gifted students within motive/strategy groupings appears to be the examination of the interaction of motivational and strategy factors, as discussed in Question 5.

This study supports the findings of Bayley and Schaefer (1964), Kagan, Sontag, Baker, and Nelson (1958), Ralph, Goldberg, and Passow (1966) and Whitmore (1980) that motivation plays a role in academic achievement and underachievement. Motivation is important, but the concurrent examination of motivation and strategy may be an even more powerful way of differentiating between underachievement and achievement in gifted students.

Strategy Factors

(2) Do underachieving gifted students score lower on strategy measures such as critical thinking skills, reading strategies, and error monitoring skills relative to gifted achievers?

Whitmore (1980) identifies a number of traits exhibited by underachievers that could be considered to be poor strategies. These include:

-exhibits poor test performance
-is achieving at or below grade-level expectations in one or all of the basic skill areas: reading, language arts, mathematics
-turns in daily work that is frequently incomplete or poorly done
-exhibits vast gap between qualitative level of oral and written work
-seems to avoid trying new activities to prevent imperfect performance; evidences perfectionism, self-criticism
-does not function comfortably or constructively in a group of any size
-tends to set too unrealistic self-expectations, goals too high or too low
-dislikes practice work or drill or memorization and mastery
-is easily distractible, unable to focus attention and concentrate efforts on tasks
-has difficulty in peer relationships; maintains few friendships (p. 237)

Strategies appear to be a valid consideration in the profile of underachievement in gifted students.

Of the various strategy factors measured initially, results indicated that the ability to discern whether statements are true (Cornell Critical Thinking Test) and the ability to monitor errors when reading (Error Detection Task) differed between the underachieving and the achieving gifted students, with achieving students superior in both cases (see Table 10). This would indicate that achieving gifted students are more likely to apply appropriate strategies in reading and are practiced in such strategies to the extent that the strategies are used in all reading tasks. However, the ability to express the most appropriate reading strategy to use in a given situation (Paris Reading Awareness Questionnaire) did not differ between the underachieving and the achieving gifted students (see Table 10) indicating that both underachieving and achieving gifted students are aware of appropriate strategies although the underachieving students do not apparently use the strategies consistently.

In contrast to the results from the first year analysis, the qualitative analysis in the second year generally indicated that there were few differences between the underachieving

and achieving gifted students on strategies. The qualitative analysis further indicated that the factors of motivation and strategy functioned independently of each other. On the strategy measures, membership in the high strategy groups was associated with high scores while membership in the low strategy groups was associated with low scores irrespective of motivational grouping or achievement level. Thus, strategy factors, in themselves, were generally not associated with underachievement or achievement by gifted students. Results of the Vygotsky Blocks (see Figure 25), administered in the second year only, failed to differentiate between the underachieving and achieving gifted students within the motive/strategy groupings.

While the strategy measures differentiated between the achieving and underachieving gifted students as a whole (MANOVA), they did not differentiate between underachieving and achieving students within the same strategy grouping in the second year of analysis. However, the combination of motivational and strategy measurements within the same instrument (Learning Process Questionnaire) did indicate consistent differences between underachieving and achieving gifted students. Thus, a more profitable approach to differentiating underachieving from achieving gifted students within motive/strategy groupings appears to be the examination of the interaction of motivational and strategy factors as discussed in Question 5.

The present study tends to support the findings of Shore and Dover (1987), Whitmore (1980), and Stelmaschuk (1986) who reported that underachievers tended to be using poorer strategies such as ineffective study habits.

Consistency Over Grade Levels

(3) Do motivation and strategy measures of underachieving gifted and achieving gifted students remain constant over grade levels?

Little research is available examining consistency over grade levels and/or time. Underachievement has, however, been classified according to its duration (Fine, 1967;

Whitmore, 1980). Whitmore (1980) classifies the duration of underachievement as either temporary/situational or chronic. Temporary/situational is described by Whitmore (1980) as underachievement "...precipitated by a temporary period of disturbance such as divorcing parents, ill health, or a consuming new interest, or by a situation such as moving to a new school or experiencing a personality conflict with the teacher" (p. 169). Chronic, on the other hand, is described as underachievement that has been "...established for a long period of time and there are no indications that it is being created by a temporary situation" (p.170). Since students who might be considered temporary/situational were excluded as subjects for this research the pattern of underachievement would be expected to be consistent.

Consistency over grades in this study was assessed in two different ways; consistency of achievement/underachievement and consistency of motivation/strategy categorization. In terms of the former, 161 of the original sample of 164 were found to be stable with respect to achievement category, while three students changed from one category to the other over the two years of the study. Cases S and T changed from achiever to underachiever, while Case U changed from underachiever to achiever. These are very dramatic changes because the students moved from a score in excess of one and one-half standard deviations on one side of the mean to one and one-half standard deviations on the other side. With regard to the second categorization, the first year MANOVA indicated no significant interaction within grades on motivational or strategy factors (see Tables 9 & 12). This would indicate consistency over grades on motivational and strategy factors.

Examination of the median split also revealed a generally consistent pattern of motives and strategy. Only two (Case A and Case B) of the twenty-one students demonstrated a change of category over the two years. Both cases were underachievers who in the first year were considered to be high on motivation and high on strategy. Their change would indicate progressive underachievement. These two students were members

of the high/high underachieving group which appears to be somewhat of a conundrum in itself. All other students appeared to exhibit a consistency on motivational and strategy factors over grades and years.

The qualitative analysis confirmed the consistency over grades since there was little variation in scores over the two years that could not be explained by regression toward the mean and results expected due to normal test-retest variation. The exception occurred with the Cornell Critical Thinking Skills Test where a grade effect was found (see Table 11). In general, the achieving gifted students had higher scores in the second year as expected; however, the underachieving gifted students tended to have lower scores in the second year (see Figure 22). It is possible that the underachieving students become less effective in their use of strategies over time. This phenomenon has not been reported previously and is an area for further study.

In summary, the motivation and strategy scores of both underachieving and achieving gifted students tended to remain constant over grade levels indicating that the scores are representative of the students and not an artifact or testing error. In addition, both underachievement and achievement in the gifted are constant although, in some cases, matic life events may lead to change.

A Common Profile

(4) Is there one common profile or are there many profiles to describe the underachieving gifted population?

Anastasi (1976) and Thorndike (1963) described educational underachievement from a natural perspective (statistical error). Some degree of "natural" underachievement would be expected to result from test error involved in assessing expected achievement and actual achievement. "Natural" underachievement, however, does not appear to account for the majority of cases of observed underachievement.

Research on the underachieving gifted has tended to use overt (identified) underachievers. The research has produced a number of typologies predominantly based upon case studies (Hitchfield, 1973; Rimm, 1986; Whitmore, 1980). There is no single generally accepted typology which has emerged from research on overt underachievement.

When both overt and covert (unidentified) underachievement are examined on factors of motive and strategy, there is also no common profile. In this study no one common profile emerged as a descriptor of underachievement; however, motivation and strategies as related to the school environment proved to be a common theme. What is of note is the significance of the school environment (see Figures 7 & 12) on both academic achievement and underachievement as opposed to other environmental variables such as family situation or personality variables such as locus of control. Both the quantitative tests on self-perception, self-esteem, critical thinking skills, and error detection tasks and the qualitative interview revealed that in the majority of cases, the response to school environment, measured by the approach to learning, was an important variable.

There were exceptions, however. Two underachieving students (Case F and Case K) had problems in the areas of memory, attention, and written expression. Case F differed from Case K in that Case F had a strong support network from family and friends. Although further testing of the extent of the problems was not conducted, there was sufficient evidence from the testing and interviews to suggest that the underachievement, in part, might be attributable to inappropriate strategies resulting from learning problems. In both cases there was a desire to change and a difficulty in understanding the mixed messages of being "smart at some things and so dumb in others." These two students' profiles might be consistent with descriptions of learning deficits or the learning disabled gifted student (Fedoruk & Yewchuk, 1986; Fox, 1984; Wolf & Gyci, 1981).

The present study did not involve extensive investigation into family dynamics but questions were posed in the interviews regarding the family situation. The etiology of underachievement, in the majority of cases, appeared to be a result of the academic situation

and not the family environment. The exception might be Case H, where the underachievement may have been caused or aggravated by the family situation. In this case the student appeared to have not only academic difficulties which manifested themselves in the form of poor motivation and strategies, but also emotional and social problems.

One of the trends which emerged from interpreting the charts of the test results was the greater variation of scores for underachieving students when compared with their achieving counterparts. The wider range of scores might indicate that the underachieving gifted students are a less homogeneous group than the achieving gifted students. Consequently, a common profile of the underachieving gifted student is unlikely. It may; however, be possible to propose a model of underachievement incorporating current information about underachieving and achieving gifted students so as to direct and stimulate further research.

Patterns of Motives and Strategies Between Underachievers and Achievers

(5) How are motivation and strategy patterns similar and/or different between underachieving and achieving gifted students?

To date, there does not appear to be research reporting on the combination of motives and strategies for the gifted population. Biggs (1978, 1979, 1984, 1985, 1987) and Biggs and Telfer (1987) have reported on studies combining motive and strategy for the general population.

As reported above, neither the motivational nor the strategy factors alone distinguished between underachievers and achievers in this study; however, when motivational and strategy factors (Learning Process Questionnaire) were combined the results differentiated the underachievers from the achievers. Consistency in student approaches to learning (Biggs, 1987) was noted for both underachieving and achieving gifted students.

Achieving students on the whole used motives and strategies that were in keeping with deep, deep-achieving, and achieving approaches to learning (see Figure 26). Although they may not have been satisfied by the activities of school, they nevertheless motivated themselves to gain success in school. Motivation in school was accomplished through becoming the model student, competing for marks with other high achieving students, maintaining standing on the honour role, or modifying school tasks to enable them to be motivating.

Underachieving students generally used motives and strategies associated with surface-achieving, surface, and low-achieving approaches. These students were not motivated by the activities of school and thus attained only average or passing grades. They were motivated by success in activities outside the school environment, in creative modification of tasks, in associations with friends whom they considered rebellious, or in the knowledge that if they desired they could improve their marks.

The exception to the clear distinction between achievers and underachievers with the combined motive/strategy factors was Case L who was an underachiever with a deep approach to learning. Biggs (1987) describes the possible conflict that can occur when students having a deep approach find their personal goals are not consistent with those of the institution. In such cases the student may opt for the satisfaction of personal goals over those of the institution thereby becoming an academic underachiever.

While the factors of motivation or strategy alone did not distinguish between underachieving and achieving gifted students, the combination of these factors resulted in a generally effective means of differentiating the two groups. There has been little research to date evaluating the interaction of factors associated with achievement. Biggs (1987) has developed a model to attempt to classify students by their approach to learning and their performance outcome.

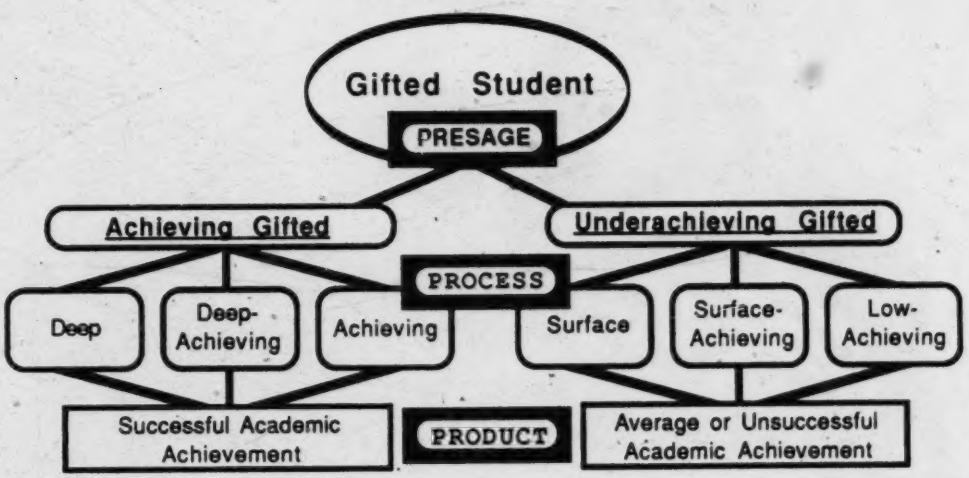
Model

(6) Is there a model that can be applied to underachieving and achieving gifted students that will incorporate motivation and strategy factors?

Biggs' student approaches to learning was adapted for gifted underachievers and achievers (see Figure 27). The interaction of motivation and strategies on approaches to learning are indicated on the model. The testing and interviews from the second year were expected to reveal students with successful academic achievement who would utilize deep, deep-achieving, or achieving approaches. Students with average or unsuccessful academic achievement were expected to be surface-achieving, surface, and low-achievers. Data on the twenty-one tested students revealed a consistent pattern for the achievers. For the underachievers, the results were generally consistent with the exception of Case L. Thus, overall the model appears to be useful for investigating achievement and underachievement of gifted students.

Figure 27

Model of Achieving and Underachieving Gifted Profiles



Biggs' model of presage, process, and product for examining student approaches to learning is worthy of further examination. The advantages of such a model lie in the

coordination of motivational and strategy factors as they relate to the academic setting, the process rather than product orientation, and the opportunity to move away from the stereotypical depiction of the underachieving gifted student. The multi-dimensional aspect of this model is important and appropriate in assessing the complex interrelated characteristics of students.

Students' School Perceptions

(7) What are the underachieving and achieving gifted students' perceptions of the school as a milieu for academic achievement?

Research on gifted students' perceptions of school are inconsistent. Delisle (1984) and Hitchfield (1973) reported gifted students' reactions to both the school environment and school assignments as positive and enjoyable. On the other hand, other researchers have reported that gifted students consistently expressed extreme boredom with school (Hymes &Bullock, 1975; McClusky & Walker, 1986).

Qualitative analysis of the interviews revealed that both underachieving and achieving gifted students generally expressed "boredom" of school. All of the gifted achievers reported school to be "boring". Although students in the academic challenge program enjoyed the opportunity presented by these classes, they still reported school to be boring. Achieving students tended to view school as a means to obtain personal goals and were willing to persevere academically in spite of the boredom. Of the gifted underachievers, four reported school as "boring," seven reported school to be O.K. adding negative qualifiers, and only one student (Case C) reported that school was interesting. Some of the underachieving students reported a "love of learning" and expressed an exceptional learning interest in activities outside of the school environment.

Perhaps the answer to academic underachievement is simple verging on simplistic. These gifted students found school boring. School was not viewed as the place to facilitate their learning and many of the tasks they were required to do have been previously

mastered. The separation of those who achieve from those who do not achieve might be related to those willing to "go through the motions" and those who refuse.

The general dissatisfaction with the school environment which was expressed by both underachieving and achieving students, in addition to the finding that school was the only significant factor distinguishing the underachieving from the achieving, suggests that the role of the school is of great importance in enabling and encouraging students to succeed academically. That some students succeed in spite of their dissatisfaction is to their credit and not to the credit of the school system. The role and purpose of the school may need thorough evaluation to ascertain the best means to encourage and enable each student to reach potential.

C. Implications for Future Research

In the examination of underachievement in the gifted population four areas require further address. First, studies will require the use of similar methods of selecting students as underachieving gifted thus allowing results to be replicated and compared. Second, there is a need to investigate the possible concurrent occurrence of learning deficits with underachieving giftedness. Third, the proposed model of underachieving giftedness is in the beginning stages of development and further work to refine and extend it is necessary. Fourth, further studies will be required to examine the academic appropriateness of current programs and intervention methods.

Sample Selection and Identification Procedures

Studies on gifted underachieving students generally have relied on individuals identified by parents or institutions as exhibiting poor performance. This method presents sampling bias as these students could be considered the "pathological" cases of underachievement. There is a need also to examine students who may be attaining to the requirements of school but are underachieving according to their estimated potential.

Unlike the samples used in many studies of underachieving gifted students, the sample for this study was comprised of both overt (identified) and covert (not identified) underachieving gifted students and might be both more representative of the population of underachieving gifted students as well as quite different from those samples employing only overt underachieving gifted students.

A major problem, however, in research that examines identified and unidentified underachievers is the lack of a uniform definition of underachievement (Dowdall & Colangelo, 1982). There is a need for a rigorous definition of underachievement which will enable replication of methods and results. Although errors of measuring predictor and predicted variables are unavoidable, consistency amongst researchers in determining inclusion and exclusion criteria of students as achieving and underachieving will enhance future research. A consistent method for identifying underachieving gifted students will allow students who currently remain unidentified and at risk of approaching learning from a mere surface or low-achieving approach to be identified for further research.

The four common approaches utilized have been identified by Farquhar and Payne (1964) as central tendency splits, arbitrary partitions, relevant discrepancies splits, and regression model selection. In this research the regression method proved useful for the identification of both achieving and underachieving gifted students. The selection of 164 overt and covert gifted students from a pool of approximately 16,000 students yielded a relatively stable sample which included all cases rather than only "pathological" cases. Of the 164 students selected only three changed achievement category over the two years of the study.

The regression model, particularly discriminant analysis as employed in this study, is preferred in future research (Pyryt, 1986). The multiple regression techniques identify the best predictor variables that maximize the differences among two or more groups. Following the suggestion of Farquhar and Payne (1964), students should not be considered to be underachieving unless the difference between predicted and actual

achievement equals or exceeds 1.00 standard error of estimate. In using the standard error of estimate or standard deviation, regression analysis serves as a more 'powerful' statistical tool over splits, partitions, and rankings. The regression model would allow for the replication of studies and comparison of results.

Underachievement Resulting from Learning Deficits

In this study there were two students (Case F and Case K) whose underachieving profiles might be attributable to learning deficits. Recent research in cognitive information processing has resulted in reported cases of individuals who failed to utilize appropriate strategies in problem solving. Observation of students with poor strategies has stirred interest in learning deficits. This term has recently been applied to gifted underachievers who are described as being concurrently learning disabled and gifted.

Learning disabled gifted is a relatively new direction in the examination of the underachieving gifted (Meisgeier, 1978) and as such has limited research and few programs addressing perceived needs. Hammill, Leigh, McNutt, and Larson (1981) define learning disabilities as being "a generic term that refers to a heterogeneous group of disorders manifested by significant difficulties in the acquisition and use of listening, speaking, reading, reasoning, or mathematical abilities." (p. 336). Since definitions of both giftedness and learning disabilities are so amorphous from an operational perspective it appears extremely likely that there will be some degree of overlap.

In a study conducted by Mauser (1979) of over 5000 children in classes for the learning disabled, it was found that 2.3 per cent had I.Q.s bordering on or over 120 Full Scale points, enabling them to be candidates for gifted programming. Similarly, the "Project Self Discovery" program (Purkey, 1967) from the Pine View School in Sarasota, Florida found from a population of four hundred and fifty students throughout the county who attended daily, that five and one-half percent of the students who had met the local and

state guidelines for giftedness and had been accepted into the school programs had later been found to also meet the criteria for learning disabled.

Prior to Krippner and Herald's (1964) article "Reading Disabilities among the Academically Talented", literature suggesting gifted individuals could be learning disabled was nonexistent. Krippner and Herald (1964) examined possible reasons for reading disabilities within the gifted population. Besides socio-cultural difficulties, Krippner and Herald identified physiological complications. These disorders were thought to be present in the peripheral or central nervous systems or in the endocrine system.

In a later study at the Kent State Child Study Center, Krippner and Herald (1965) concluded that the major factors contributing to reading disturbances in academically talented, average, and slow learning pupils were emotional disturbance, disturbed neurological organization, and brain damage. Since this report was presented prior to the widespread use of the term learning disabled, it would appear likely that the latter two categories suggested for reading difficulties among the academically gifted could be considered learning disabled. With the later emphasis on learning disabilities in the mid 1970s, educators of the gifted began to discuss the problems of a group termed the gifted learning disabled (Elkind, 1973). It was felt that educational programs should capitalize on the students' strengths while remediating or compensating for their weaknesses.

Recent literature on the underachieving gifted child has begun to document the substantial evidence for learning disabilities among this population group (Bow, 1988; Chermak & Burgerud, 1983; Fine & Pitts, 1980; Kvasnicka, L. & Polak, A. 1983; Whitmore, 1980, 1988a). Evidence of low self-esteem and personality problems would still be expected for this group, but they are not seen as the primary cause of underachievement. The learning disability supplies the catalyst to a circular relationship in which low self-concept results in avoidance of academic situations or challenges and academic failure confirms the low self-concept (Newman, 1976). The learning disabilities

explanation has, in turn, added to the volume of proposed causes for underachievement in the gifted.

Delays in development, impairment in certain skill areas, specific learning disabilities, neurological impairment, characteristics of low energy levels, or hyperactivity all are believed to be factors that may promote underachievement in the gifted. In this situation the disability, coupled with the failure to address the disability, results in underachievement.

Development of the Model

Although there are "characteristics" checklists of the underachieving gifted student, case study descriptions, and typologies (Hitchfield, 1973; Rimm, 1986; Stelmaschuk, 1986; Whitmore, 1980) these are the initial attempts to classify a complex condition. What is needed is a comprehensive model which will incorporate and organize the information on underachievement in gifted students in a comprehensive manner which will not only delineate the variants of the condition, but also provide direction for appropriate intervention. The model proposed in this study appears to be advantageous for this purpose.

The focus of the proposed model is on school and learning rather than on pathology. Consequently the model is appropriate for the assessment of the achievement of students in school. The proposed model incorporates both motives and strategies concurrently in an assessment of the student's approach to learning and is process orientated rather than product centred. By providing a framework to assess how the student thinks as well as the strategies the student employs, the model emphasizes the individual student rather than the underachievement and moves away from the stereotypical depiction of gifted underachievement. In addition, the model will provide direction for appropriate intervention within the school environment and continue to be useful in assessing the student's progress.

Academic Appropriateness and Intervention

The description of school as being 'boring' was common to both achieving and underachieving gifted students. The reaction to 'boredom' was different among both groups. Achieving gifted students exhibited a greater competitive drive with other students, challenged themselves to be on the honour role, strove for acceptance from teachers and approval from parents, or developed such a desire to learn that they were able to extract the best school offers. Underachieving gifted students, on the other hand, developed great emphasis on outside activities, fostered friendships with others who were opposed to school, or developed surface strategies in order to succeed to their level of satisfaction.

'Boredom' is not unique to underachieving and achieving gifted students and some of the problems identified in the study are not specific to intellectually talented students. Comparison of gifted achievers and underachievers with the general school population would aid in determining the extent to which academic mismatches between school and the gifted student on variables such as learning abilities and opportunities (Khatena, 1982), mental ages, and learning rates (Dunlap, 1975) have aggravated the perception of school as a boring milieu of information reception, retention, and recovery. Problems such as persistent dislike of the school, resistance to learning facts rather than meaning, lack of academic motivation, and passive knowledge acquisition for external reward while being intrinsically motivated in nonacademic activities were reported by most of the gifted students interviewed. School, for most of the sample, had become a necessary evil rather than a place to facilitate learning. Teachers were portrayed as dispensers of knowledge rather than mediators of the learning process. The perceptions of school appeared to be exacerbated by intellectually precocious students.

Partial solutions to the mismatch between the school and the gifted student have been proposed through activities such as challenge programs and enrichment classes. Unfortunately, underachieving gifted students generally do not attain the requirement to

enter these limited enrollment programs. Those who are identified for such programs, however, were reported to have no significant gains in academic success over those who did not enter such programs (Stelmaschuk, 1986). Limited research is available on the profiles of students who enter intervention programs, the comprehensiveness of the program, the emphasis of the program, and the long-term effectiveness of the program. Examining motives and strategies appears to be a potential model for the investigation of the connection between the effectiveness of intervention programs and the profile of the underachieving and achieving gifted student.

Biggs' (1987) approach to student learning includes intervention strategies specific to each processing group. The intent is to facilitate learning by making students aware of their motives and strategies. The goal is to move the student from lower achieving processes toward the deep and deep-achieving approaches to learning. Biggs and Rihn (1984) reported significant shifts from surface approaches to deep and achieving approaches among college students following metacognitive intervention. Edwards (1986) reported similar results on post-test differences with students shifting to achieving and deep approaches in the intervention group which focussed on study habits and the need for changes in students' approaches to studying. Intervention to enhance academic performance which considers the learner's perspective (motive and strategies) appears promising (Biggs, in press). Since underachieving and achieving motive/strategy groups were differentiated on the basis of the combination of motivational and strategy factors, intervention which is metacognitively based might well enhance academic performance.

Gifted underachievers and achievers require special assistance to improve the quality of their educational experience. Even though gifted students may not be overrepresented among school drop-outs or underachievers, the approach to learning from a motives and strategy perspective is indiscernible from the school drop-out (Parker, 1979). The high number of students utilizing surface and low-achieving approaches and the low number of students employing deep approaches points to a failure of our

educational system to address the needs and to provide the required direction for gifted children. Gifted individuals such as Winston Churchill, Harvey Cushing, Charles Darwin, Thomas Edison, Albert Einstein, and Woodrow Wilson were considered to be academic underachievers and reported to have received little benefit from conventional education (Goertzel & Goertzel, 1962; Vail, 1979). Individualized intervention programs in their lives in the form of special tutoring and a modelling of a deep approach to learning are acknowledged by them to be the contributing factors resulting in the realization of their potential. The lack of appropriate educational programs for gifted students wastes their potential. The interview material from this study indicates that the inappropriate match between the gifted student and the school curriculum appears to be a major contributor to the underachieving child's adoption of inferior motives and strategies.

The necessity of appropriate and early intervention for underachieving gifted students must be also emphasized. When the consistency over grades of the students as a whole is contrasted with the dramatic change in Case C, the importance of intervention for the underachieving gifted student becomes clear. Without appropriate intervention, there is little chance of improvement and the danger exists of further decline as in the situation of Cases A and B and the unexpected decline of the underachievers on the Cornell Critical Thinking Skills Test. Although the high scores on the Paris Reading Awareness Questionnaire might indicate that both underachieving and achieving gifted students are very aware of effective reading strategies, the variations in the Error Detection Task and the results of the Cornell Critical Thinking Test for underachieving students suggest that the strategies employed by underachieving gifted students become a greater hindrance to achievement over time. If gifted students were identified early and supervised carefully, the risk of decline in the academic achievement of these students would be expected to diminish.

Further comprehensive study of a model of the underachieving student on factors of motivation and strategy and the effectiveness of intervention programs that emphasize deep and deep-achieving approaches to learning is urgently required.

REFERENCES

Abraham, W. (1981). The underachieving gifted child. In B. Miller & M. Price, (Eds.), The gifted child, the family, and the community. New York: Walker.

Anastasi, A. (1976). Psychological Testing, (4th. ed). New York: Macmillan.

Atkinson, J. W. (1978). Motivational determinants of intellective performance and cumulative achievement. In J. W. Atkinson & J. O. Raynor (Eds.), Personality, motivation, and achievement. New York: John Wiley & Sons.

Baarstad, J. (1978). Perceived competence and motivational orientation in normal and learning disabled children. Unpublished master's thesis, University of Denver, Denver.

Bayley, N. & Schaefer, E. (1964). Correlations of maternal and child behavior with the development of mental abilities: Data from Berkely Growth Study. Monograph of Social Research and Child Development, 29 (6, Serialo No. 97).

Baymur, F. & Patterson, C.H. (1960). Three methods of assisting underachieving high school students. Journal of Counseling Psychology, 7, 83-90.

Biggs, J. B. (1968). Information and human learning. Melbourne, Australia: Cassell Australia.

Biggs, J. B. (1978). Individual and group differences in study process. British Journal of Educational Psychology, 48, 266-279.

Biggs, J. B. (1979). Individual differences in study processes and the quality of learning outcomes. Higher Education, 8, 381-394.

Biggs, J. B. (1984). Motivational patterns, learning strategies, and subjectively perceived success in secondary and tertiary students. In J. R. Kirby (Ed.), Cognitive strategies and educational performance. New York: Academic Press.

Biggs, J. B. (1985). The role of metalearning in study processes. British Journal of Educational Psychology, 55, 185-212.

Biggs, J. B. (1987). Student approaches to learning and studying. A research [Monograph]. Melbourne, Australia: Australian Council for Educational Research.

Biggs, J. B. (in press). The role of metacognition in enhancing learning. Australian Journal of Education.

Biggs, J. B. & Collis, K. F. (1982). Evaluating the quality of learning: The SOLO taxonomy. New York: Academic Press.

Biggs, J. B. & Collis, K. F. (1982). Evaluating the Quality of Learning: The SOLO Taxonomy. New York: Academic Press.

Biggs, J. B. & Rihn, B. (1984). The effects of intervention on deep and surface approaches to learning. In J. R. Kirby (Ed.), Cognitive strategies and educational performance. New York: Academic Press.

Biggs, J. B. & Telfer, R. A. (1987). The process of learning: Psychology for Australian educators. Sydney, Australia: Prentice-Hall.

Bonsall, M. & Stefflre, B. (1959). The temperment of gifted children. In J. L. French (Ed.), Educating the gifted. New York: Holt & Co.

Bow, J. N. (1988). A comparison of intellectually superior male reading achievers and underachievers from a neuropsychological perspective. Journal of Learning Disabilities, 21 (2), 118-123.

Bricklin, B., & Bricklin, P. (1967). Bright child, poor grades. New York: Delacorte Press.

Brown, A. L. (1978). Knowing when, where, and how to remember: A problem of metacognition. In R. Glaser (Ed.), Advances in instructional psychology, Vol 1. Hillsdale, New Jersey: Erlbaum.

Burks, R.S., Jensen, D.W., & Terman, L. M. (1930). The promise of youth: Follow-up studies of a thousand gifted children. Stanford: Stanford University Press.

Carr, M. & Borkowski, J. G. (1987). Metamemory in gifted children. Gifted Child Quarterly, 31 (1), 40-44.

Chatman, S. P. & Willford, J. N. (1982). The gifted student's awareness and use of cognitive strategies in academic tasks: An exploratory study. Paper presented at the annual meeting of the National Association for Gifted Children, New Orleans.

Chermak, G. & Bergerud, D. (1983). Receptive language of gifted and learning disabled-gifted children. The Exceptional Child, 30 (3), 226-229.

Clark, B. (1979). Growing up gifted. Columbus: Charles E. Merrill.

Clifford, M. & Cleary, T. (1972). The relationship between children's academic performance and achievement accountability, Child Development, 43, 647-655.

Cohn, S. (1981). What is giftedness? A multi dimensional approach. In A.H. Kramer (Ed.) Gifted children. New York: Trillium Press.

Cornell, J. P. (in press). A new multidimensional measure of children's perceptions of control. Child Development.

Cornell, N. (1986). The effects of an intervention programme on the learning process and writing competence of year 11 students. Unpublished master's thesis, University of Newcastle.

Cox, C. M. (1926). The early mental traits of three hundred geniuses. Stanford: Stanford University Press.

Crandall, V. C., & Lacey, B. (1972). Children's perceptions of internal-external control in intellectual-academic situations and their embedded figures test performance. Child Devleopment, 43 (4), 1123-1134.

Crandall, V. C., Katkovsky, W., & Crandall, V.J. (1965). Children's beliefs in their control of reinforcements in intellectual academic achievement behaviors. Child Development, 36, 91-109.

Crittenden, M., Kaplan, H., & Heim, J. (1984). Developing effective study skills and self-confidence in academically able young adolescents. Gifted Child Quarterly, 1, 25-30.

Cronbach, L. J. (1970). Essentials of psychological testing. (3rd ed.), New York: Harper & Row.

Dalsem, E. & Finney, B. (1963). Group counseling for gifted underachieving high school students in Sequoia High School District. California: Sequoia Union High School, Sequota.

Davis, H. B. & Connell, J.P. (1985). The effect of aptitude and achievement status on the self-system. Gifted Child Quarterly, 29 (3), 131-136.

Davis, H. B. & Rimm, S. (1985). Education of the gifted and talented. Englewood Cliffs, New Jersey: Prentice-Hall.

De Charms, R. (1981). Personal causation and locus of control: Two different traditions and two uncorrelated measures. In H. Lefcourt (Ed.), Research with the locus of control construct: Vol. 1. New York: Academic Press.

De Charms, R. (1984). Motivation enhancement in educational settings. In R. Amex & C. Ames (Eds.), Research on motivation in education Vol. 1. Orlando, Floridia: Academic Press.

Deci, E. (1975). Intrinsic motivation. New York: Plenum.

Delisle, J. R. (1984). Gifted children speak out. New York: Walker & Company.

Delisle, J. R. & Renzulli, J. (1982). The revolving door identification and programming model: Correlates of creative production. Gifted Child Quarterly, 26 (2), 89-95.

Dewey, J. (1933). How we think. Boston: D.C. Health.

Donaldson, T. (1974). Affective teaching in the Alvin Rock Voucher schools. (Rand Corporation, 1700 Main Street, Santa Monica, CA 90406).

Dover, A. C. (1983). Metacognition and problem solving in gifted children. Unpublished master's thesis, McGill University, Montreal.

Dowdall, C. & Colangelo, N. (1982). Underachieving gifted students: Review and implications. Gifted Child Quarterly, 26 (4), 179-183.

Dressel, P. & Mayhew, L. (1954). General education: Exploration in evaluation. Final Report of the Cooperative Study of Evaluation in General Education. Washington, D.C.: American Council on Education.

Dunlap, J. M. (1975). The education of children with high mental ability. In W. M. Cruickshank & G. O. Johnson (Eds.), Education of exceptional children and youth. Englewood Cliffs, N.J.: Prentice-Hall.

Eccles, J. S. (1985). Why doesn't Jane Run? Sex differences in educational and occupational patterns. In F.D. Horowitz and M. O'Brien (Eds.), The gifted and talented: Developmental perspectives. Washington, D.C.: American Psychological Association.

Edwards, J. (1986). The effects of training in study skills on student approaches to learning and examination performance. Unpublished master's thesis, University of Newcastle.

Elkind, J. (1973). The gifted child with learning disabilities. Gifted Child Quarterly, 3, 96-97.

Ennis, R. H. & Millman, J. (1961). Cornell Critical Thinking Test, Forms X and Z. New York: Cornell University.

Ennis, R. H. (1962). A concept of critical thinking. Harvard Educational Review, 32 (1), 81-111.

Entwistle, N. J. (1981). Styles of learning and teaching. Chichester: Wiley.

Farquhar, W. W. & Payne, D. A. (1964). A classification and comparison of techniques used in selecting under- and over-achievers. Personnel and Guidance Journal, 42, 874-884.

Fedoruk, G., & Yewchuk, C. (1986). The gifted learning disabled: Identification and instruction. Education Canada, 26 (4), 25-29.

Fine, M. & Pitts, R., (1980). Intervention with underachieving gifted: Rationale and strategies. Gifted Child Quarterly, 24, 51-55.

Finney, B.C. & Dalsem, E. V. (1969). Group counseling for gifted underachieving high school graduates. Journal of Counseling Psychology, 16 (1), 87-94.

Flavell, J. H. (1976). Metacognitive aspects of problem solving. In L. B. Resnick (Ed.), The nature of intelligence. Hillsdale, New Jersey: Erlbaum.

Fox, L. (1981). Preparing gifted girls for future leadership roles. Gifted, Creative, and Talented, 17, 7-11.

Fox, L. (1984). The learning-disabled gifted child. Learning Disabilities, 3 (10), 117-128.

Gallager, J. J. (1964). Teaching the gifted child. Boston: Allyn & Bacon.

Gallager, J. J. (1975). Teaching the gifted child, (2nd. ed.). Boston: Allyn & Bacon.

Gallagher, J. J. (1979). Issues in education for the gifted. In A. H. Passow (Ed.), The gifted and the talented: Their education and development. Chicago, IL: The University of Chicago Press.

Gardner, H. (1983). Frames of mind: The theory of multiple intelligences. New York: Basic Books.

Ghuman, P. A. S. (1975). The cultural context of thinking. Windsor: National Foundation for Educational Research.

Goertzel, V. H. & Goertzel, M. G. (1962). Cradles of eminence. Boston: Little, Brown, & Company.

Goldberg, M. (1965). Research on the talented. New York: Bureau of Public Teachers College, Columbia University.

Government of Alberta. (1985). Secondary education in Alberta: Policy statement, Edmonton: Learning Resource Distribution Centre.

Gowan, J. (1957). Dynamics of the underachievement of gifted children. Exceptional Children, 24, 98-101.

Hallahan, D., Hall, R., Ianna, S., Kneedler, D, Lloyd, J., Loper, A, & Reeve, R. (1983). Summary of research findings at the University of Virginia Learning Disabilities Research Institute. Exceptional Educational Quarterly, 4 (1), 95-110.

Hammill, D. D., Leigh, J. E., McNutt, G. & Larsen, S. C. (1981). A new definition of learning disabilities. Learning Disability Quarterly, 4 (4), 336-342.

Hanna, G., Dyck, N., & Holen, M. (1979). Objective analysis of achievement-aptitude discrepancies in L.D. classification. Learning Disability Quarterly, 2, 32-38.

Harrington, M. J. (1969). The relevance of verbal cues to the behaviors of EMR and non-retarded children. Unpublished master's thesis, University of Alberta.

Harter, S. (1981). A new self-report scale of intrinsic versus extrinsic orientation in the classroom: motivational and informational components. Developmental Psychology, 17 (3), 300-312.

Harter, S. (1980). A scale of intrinsic versus extrinsic orientation in the classroom. Denver, CO: University of Denver.

Harter, S. (1981). Intrinsic versus extrinsic orientation in the classroom. Denver, CO: University of Denver.

Harter, S. (1982). The perceived competence scale for children. Child Development, 53 (1), 87-97.

Hecht, K. A. (1975). Teacher ratings of potential dropouts and academically gifted children: Are they related? Journal of Teacher Education, 26, 172-175.

Hitchfield, E. M. (1973). In search of promise: A long-term, national study of able children and their families. London: Longman Group Limited.

Horn, A. (1941). Uneven distribution of the effects of specific factors. Education Monographs, 12, University of Southern California.

Horney, K. (1937). The neurotic personality of our time. New York: W.W. Norton & Co.

Humphreys, L. G. (1985). A conceptualization of intellectual giftedness. In F.D. Horowitz & M. O'Brien (Eds.), The gifted and talented: Developmental perspectives. Washington, D.C.: American Psychological Association.

Hymes, R. M. & Bullock, F. O. (1975). Alternative schools: Answers to the gifted child's boredom. Gifted Child Quarterly, 19 (4), 340-345.

Janos, P. M. & Davidson, J. E. (1985). Psychosocial development in intellectually gifted children. In F.D. Horowitz & M. O'Brien (Eds.), The gifted and talented: Developmental perspectives. Washington, D.C.: American Psychological Association.

Jick, T.D. (1979). Mixing qualitative and quantitative methods: Triangulation in action. Administration Science Quarterly, 24, 602-611.

Jones, B. F. (1986, April). Cognitive strategies. Educational Leadership, pp. 5-11.

Kagan, J., Sontag, L., Baker, C. & Nelson, U. (1958). Personality and I.Q. change. Journal of Abnormal Social Psychology, 56, 261-266.

Kanoy, R., Johnson, B. & Kanoy, K. (1980). Locus of control and self-concept in achieving and underachieving bright elementary students. Psychology in the Schools, 17 (3), 395-399.

Karnes, M., McCoy, G., Zehrbach, R., Wollersheim, J., & Clarizio, H. (1962). The efficacy of two organizational plans for underachieving intellectually gifted children. Report to the Champaign Community Unit Schools No. 4, Champaign, Illinois.

Khatena, J. (1982). Education psychology of the gifted. New York: John Wiley and Sons.

King, E. M., Hieronymus, A. N., Lindquist, E. F., & Hoover, H. D. (1982). Canadian Tests of Basic Skills: Multilevel Edition teacher's guide. Scarborough, Ontario: Nelson Canada.

Kirby, J. R. & Biggs, J. B. (1981). Learning styles, information processing abilities, and academic achievement. Final Report, Australian Research Grants Committee, Belconnen ACT.

Kowitz, G. & Armstrong, C. (1961). Under-achievement: Concept or artifact? School and Society, 89, 347-349.

Kranz, B. (1975). From Lewis Terman to Matina Horner: What happens to gifted girls? Talents and Gifts, 17 (3), 31-36.

Krippner, S. & Herald, C. (1964). Reading disabilities among the academically talented. Gifted Child Quarterly, 1, 12-20.

Krippner, S. & Herald, C. (1965). Reading disabilities among academically talented, average, and slow learning pupils. New Frontiers in Special Education - Selected Convention Papers. 43rd Annual CEC Convention. Washington, D.C. The Council for Exceptional Children.

Kvasnicka, L. & Polak, A. (1983). Priciny a dosledky neprospievania zaikov zakladnych skol s nadpriemernym intelektom. (Causes and consequences of underachievement in intellectually superior basic school pupils). Psychologia a Patopsychologia Dietata, 18 (4), 345-354.

Lorge, I., Throndike, R., Hagen, E, & Wright, E. N. (1967). Manual for administration: Canadian Lorge-Thorndike Intelligence Tests. Toronto: Thomas Nelson & Sons.

Lovell, K. & Shields, J. B. (1967). Some aspects of a study of the gifted child. British Journal of Educational Psychology, 37, 201-209.

Maehr, M. (1984). Meaning and motivation: Toward a theory of personal investment. In R. Amex & C. Ames (Eds.) Research on motivation in education Vol. 1. Orlando, Floridia: Academic Press.

Mallinson, T. (1963). A comparative study of four types of treatment in improving adjustment and school achievement of gifted underachievers. Issued by the Research Department, Toronto Board of Education, Toronto, Ontario.

Maslow, A. (1954). Motivation and personality. New York: Harper & Row.

Mauser, A. (1979). Prevalence of gifted children with special learning disabilities. Unpublished report, Northern Illinois University, Dekalb, Ill.

McClelland, D. (1976). Power: The inner experience. New York: Irvington.

McClelland, R. J. (1987). Achieving and underachieving gifted: Locus of control and locus of causality. Unpublished master's thesis, University of Alberta, Edmonton.

McCluskey, K. W. & Walker, K. D. (1986). The doubtful gift. Kingston, Ontario: Ronald P. Frye & Company.

McHolland, J. (1971). Human potential seminars: An approach to turning on the gifted underachiever. A paper presented at the American Association of School Administrators Convention in Atlantic City, New Jersey.

Meisgeier, C., Meisgeier, C. & Werblo, D. (1978). Factors compounding the handicapping of some gifted children. Gifted Child Quarterly, 220 (3), 83-87.

Messer, S. B. (1972). The relation of internal-external control to academic performance. Child Development, 43, 1456-1462.

Mischel, W. (1973). Toward a cognitive social learning reconceptualization of personality. Psychological Review, 80, 252-283.

Modjeski, R. & William, M. (1983). An evaluation by a panel of psychologists of the reliability and validity of two tests of critical thinking. Educational and Psychological Measurement, 43, 1187-1197.

Morse, H. & McCune, G. (1975). Selected items for the testing of study skills and critical thinking, (3rd. ed.). Washington, D.C.: National Council for the Social Studies.

Moylan, S. & Biggs, J. B. (1983). Some characteristics of Open Foundations Course students. Report to the Department of Community Programmes, University of Newcastle.

National Commission on Excellence in Education. (1983). A nation at risk: The imperative for educational reform. Washington, D.C.: Secretary of Education, U.S. Department of Education.

Newman, J., Dember, C., & Krug, O. (1973). He can but he won't. Psycholanalytic Study of the Child, 28, 83-129.

Newman, T. (1976). The gifted in socioeducational perspective. Englewood Cliffs, N.J.: Prentice-Hall.

Nicholls, J. (1984). Conceptions of ability and achievement motivation. In R. Amex & C. Ames (Eds.), Research on motivation in education Vol. 1. Orlando, Floridia: Academic Press.

Novak, J. D. & Gowin, D. B. (1984). Learning how to learn. Massachusetts: Cambridge University Press.

Mulcahy, R., Norman, C., Peat, D., Clifford, L., Andrews, J., Cho, S., Marfo, K., & Darko-Yeboah, J. (in press). Cognitive Education Project: Progress report year three. Edmonton, Alberta: Department of Educational Psychology.

O'Neil, M. J. & Child, D. (1984). Biggs' SPQ: A British study of its internal structure. British Journal of Educational Psychology, 54, 228-234.

Ohlsen, M.M. & Gazada, G.M. (1965). Counseling underachieving bright pupils. Education, 86, 78-81.

Parker, C. J. (1979). Bright kids in trouble with the law. Gifted, Creative, and Talented, 9, 62-63.

Parsons, J., Midgely, C. & Adler, T. (in press). Age-related changes in school environment: Effects on achievment motivation. In J. Nicholls (Ed.), The development of achievement motivation. Greenwich, Connecticut: JAI Press.

Pauk, W., & Cassel, R. (1971). Manual for the Cornell learning and study skills inventory. Jacksonville, IL.: Psychologists and Educators.

Penny, R. (1951). The Vigotsky block test - a form of administration. Australian Journal of Psychology, 3, 65-83.

Pierce J. V. (1961). Personality and achievement among able high school students. Quincy, Ill: University of Chicago Quincy Youth Development Project. (From Ralph, J., Goldberg, M. & Passow, H. (1966). Bright Underachievers. New York: Teachers College Press)

Powell, A. (1971). Alternative measures of locus of control and the prediction of academic performance. Psychological Reports, 29, 47-50.

Pringle, M. L. (1970). Able misfits. London: Longman Group.

Purkey, W. (1967). An independent study project for gifted underachievers. Report to the U.S. Department of Health, Education, and Welfare, Office of Education, Bureau of Research Project No. 6-1334 College of Education, Gainesville, Florida.

Pyryt, M. C. (1986). Using discriminant analysis to identify gifted children. Journal for the Education of the Gifted, 9 (3), 223-238.

Ralph, J., Goldberg, M., & Passow, A. (1966). Bright underachievers. New York: Teachers College Press, Columbia University.

Reis, S. M., (1987). We can't change what we don't recognize: Understanding the special needs of gifted females. Gifted Child Quarterly, 31 (2), 83-89.

Renzulli, J. S. (1977). The enrichment triad model: A guide for developing defensible programs for the gifted and talented. Mansfield Center, CT: Creative Learning Press.

Renzulli, J. S. (1978). Education! Who needs it? Yearbook of Special Eduation. Chicago: Marquis Academic Press, pp. 467-80.

Renzulli, J. S. (1978b) What is giftedness? Reexamining a Definition. Phi Delta Kappan. 60, 18-24.

Rimm, S. B. (1984, February). Underachievement. Gifted, Creative, and Talented. p. 27.

Rimm, S. B. (1985, November). Identifying underachievement: The characteristics approach. Gifted, Creative, and Talented, pp. 2-5.

Rimm, S. B. (1986). Underachievement syndrome causes and cures. Wisconsin: Apple Publishing Company.

Robinson, J. (1977). Current myths concerning gifted children. In Gifts, talents and the very young. Ventura, C.A.: Ventura County Superintendent of Schools Office.

Roth, R. & Meyersburg, A. (1963). The non-achievement syndrome. Personal and Guidance Journal, 61, 535-540.

Satz, P. Taylor, H., Friel, J. & Fletcher, J. (1978). Some developmental and predictive precursors of reading disabilities: a six year follow-up. In A. Benton & D. Pearl (Eds.), Dyslexia: An Appraisal of Current Knowledge. New York: Oxford University Press.

Saurenman, D., & Michael, W. (1980). Differential placement of high-achieving and low-achieving gifted pupils in grades 4, 5 and 6 on measures of field dependence-field independence, creativity, and self-concept. Gifted Child Quarterly, 24, 81-85.

Schiff, M. Kaufman, A. & Kaufman, N. (1981). Scatter analysis of WISC-R profiles for learning disabled children with superior intelligence. Journal of Learning Disabilities, 14 (7), 400-404.

Schmeck, R. R. (1983). Learning styles of college students. In R. R. Dillon & R. R. Schmeck (Eds.), Individual Differences in Cognition Vol. 1. New York: Academic Press.

Scruggs, T. E., Mastropieri, M. A., Monson, J. & Jorgensen, C. (1985). Maximizing what gifted students can learn: Recent findings of learning strategy research. Gifted Child Quarterly, 29 (4), 181-185.

Shaw, M. & McCuen, J. (1960). The onset of academic underachievement in bright children. Journal of Educational Psychology, 51, 103-108.

Shore, B. M. (1982). Developing a framework for the study of learning style in high level learning. In J. W. Keefe (Ed.), Student learning styles and brain behavior: Programs, instrumentation, research. Reston, Virginia: National Association of Secondary School Principals.

Shore, B. M. (1987). Cognition and giftedness: New research directions.. Gifted Child Quarterly, 30 (1), 24-27.

Shore, B. M. & Dover, A. C. (1987). Metacognition, intelligence and giftedness. Gifted Child Quarterly, 31 (1), 37-39.

Silon, E & Harter, S. (in press). Perceived competence and motivational orientation in educable mentally retarded children. Journal of Educational Psychology.

Smith, B. O. (1953). The improvement of critical thinking. Progressive Education, 30 (5), 129-134.

Spatz, K., & Johnson, F. (1973). Internal consistency of the Coopersmith Self-Esteem Inventory. Educational and Psychological Measurement, 33, 875-876.

Stelmaschuk, M. (1986). Identified and unidentified gifted: A comparative analysis. Unpublished doctoral dissertation, University of Alberta, Edmonton.

Sternberg, R. J. (1984). Toward a triarchic theory of human intelligence. Behavioral and Brain Sciences, 3, 573-584.

Sternberg, R. J. (1985). Beyond IQ: A triarchic theory of human intelligence. Cambridge: Cambridge University Press.

Sternberg, R. J. (1986). Intelligence applied. San Diego: Harcourt Brace Jovanovich Publishers.

Sternberg, R. J. (1977). Intelligence information processing, and analogical reasoning: The componential analysis of human abilities. Hillsdale, New Jersey: Erlbaum.

Sternberg, R. J. & Davidson, J. E. (1983). Insight in the gifted. Educational Psychologist, 18 (1), 51-57.

Sternberg, R. J. & Davidson, J. E. (1985). Cognitive development in the gifted and talented. In F.D. Horowitz & M. O'Brien (Eds.), The Gifted and Talented: Developmental Perspectives. Washington, D.C.: American Psychological Association.

Stewin, L. L. (1968). The nature of rigidity as determined by Vygotsky test performance. Unpublished master's thesis, University of Alberta.

Stipek, D. (1984). The development of achievement motivation. In R. Ames & C. Ames (Eds.), Research on motivation in education (Vol 1). Orlando, Floridia: Academic Press.

Stones, E. (1970). Verbal labelling and concept formation in primary school children. British Journal of Educational Psychology, 40, 245-252.

Stones, E. & Heslop, J. R. (1968). The formation and extension of class concepts in primary school children. British Journal of Educational Psychology, 38, 261-271.

Terman, L. M. (1925). Mental and physical traits of a thousand gifted children. Stanford: Stanford University Press.

Terman, L. & Oden, M. (1947). Genetic studies of genius Vol. IV. The gifted child grows up. Stanford: Stanford University Press.

Thiel, R. & Thiel, A. (1977). A structural analysis of family interaction patterns and the underachieving gifted child. Gifted Child Quarterly, 21, 267-275.

Thomas, P. R. & Bain, J. D. (1982). Consistency in learning strategies. Higher Education, 11, 249-259.

Thomas, P. R. & Bain, J. D. (1984). Contextual dependence of learning approaches: The effects of assessments. Human Learning, 3, 227-240.

Thorndike, R. (1963). The concepts of over- and under- achievement. New York: Teachers College Press, Columbia University.

Tidwell, R. (1980). A psycho-educational profile of 1,593 gifted high school students. Gifted Child Quarterly, 24, 63-68.

Tittle, C. K. (1972). Review of the Lorge-Thorndike Intelligence Tests and the Cognitive Abilities Tests. In O. K. Buros (Ed.), The seventh mental measurements yearbook. Highland Park, NJ: The Gryphon Press.

Turtle, F. B. & Becker, L. A. (1980). Characteristics and identification of gifted and talented students. Washington, D.C.: National Education Association.

U.S. Office of Education. (1981). Education consolidation act. PL 97-35 (Sec 582).

Vail, P. L. (1979). The world of the gifted child. New York: Walker & Company.

Vygotsky, L. S. (1939). Thought and speech. Psychiatry, 2, 29-54.

Vygotsky, L. S. (1966). Thought and language. Cambridge, Mass: Harvard University Press.

Walker, B. (1974). The effects of a decision-making theory paradigm on the classroom behavior of individual mid-school students referred to the counselor. (Ed. 094-309): Eric Clearinghouse.

Watkins, D. (1982). Academic achievement and the congruence of study motivation and strategy. British Journal of Educational Psychology, 52, 260-263.

Watkins, D. & Hattie, J. (1981). The learning processes of Australian university students: Investigations of contextual and personological factors. British Journal of Educational Psychology, 51, 384-393.

Wechsler, D. (1958). The measurement and appraisal of adult intelligence. Baltimore: Williams & Wilkins.

Weiner, B. (1972). Theories of motivation: From mechanism to cognition. Chicago: McNally.

Weiner, B. (1984). Principles for a theory of student motivation and their application within an attributional framework. In R. Amex & C. Ames (Eds.), Research on motivation in education Vol. 1. Orlando, Floridia: Academic Press.

Weiner, J. (1986). Alternatives in the assessment of the learning disabled adolescent: A learning strategies approach. Learning Disabliities Focus, 1, (2), 97-107.

Whitmore, J. R. (1979). The etiology of underachievement in highly gifted young children. Journal for the Edcation of the Gifted, 3 (1), 38-51.

Whitmore, J. R. (1980). Giftedness, conflict and underachievement. Boston: Allyn & Bacon.

Whitmore, J. R. (1985). New challenges to common identification practices. In J. Freeman (Ed.), The psychology of gifted children. London: John Wiley & Sons.

Whitmore, J. R. (1988a). Gifted children at risk for learning difficulties. Teaching Exceptional Children, 20 (4) 10-14.

Whitmore, J. R. (1988b). Educational reform and gifted education. Roeper Review, 10 (4), 197-200.

Whitmore, J. R. & Maker, C. J. (1985). Intellectual giftedness in disabled persons. Rockville, MD: Aspen Systems Corp.

Wolf, J. & Gygi, J. (1981). Learning disabled and gifted: Success or failure? Journal for the Education of the Gifted, 4, (3), 199-206.

Wolk, S. & Eliot, J. (1974). Information-generated influence as a function of locus-of-control patterns in children. Child Development, 45 (4), 928-934.

Yu, A. Y. (1981). The inplications of language, culture, social class, and cognitive sytle in higher cognitive processes. Unpublished doctoral dissertation, University of Alberta, Edmonton.

Ysseldyke, J. (1983). Current practices in making psychoeducational decisions about learning disabled students. Journal of Learning Disabilities, 16 (4), 226-232.

Ziv, A., & Doni, M. (1977). Parental perception and self-concept of gifted and average underachievers. Perceptual and Motor Skills, 44, 563-568.

Zuccone, C. F. & Amerikaner, M. (1986). Counseling gifted underachievers: A family systems approach. Special Issue: Counseling the gifted and talented. Journal of Counseling and Development, 64 (9), 590-592.

APPENDIX A

MEANS, STANDARD DEVIATIONS, STANDARD ERROR, AND VARIANCE OF DEPENDENT MEASURES

All Students (n = 164)

	Mean	Std. Dev.	Std. Error	Variance
Coopersmith School:	5.268	1.966	.154	3.866
Coopersmith Social:	6.122	1.806	.141	3.261
Coopersmith Home:	5.476	2.239	.175	5.012
Coopersmith General:	18.86	4.208	.329	17.704
Coopersmith Total:	71.494	15.718	1.227	247.061
Harter Cognitive:	3.253	.499	.039	.249
Harter Social:	2.886	.616	.048	.380
Harter Physical:	2.731	.755	.059	.570
Harter General:	2.958	.563	.044	.317
Crandall Intrinsic:	25.134	3.519	.275	12.387
Paris Reading:	33.427	3.288	.257	10.811
Cornell Critical:	33.966	9.274	.724	86.016
Error Task:	4.457	2.994	.234	8.961

Underachievers (n = 87)

	Mean	Std. Dev.	Std. Error	Variance
Coopersmith School:	4.851	2.110	.226	4.454
Coopersmith Social:	6.115	1.858	.199	3.452
Coopersmith Home:	5.471	2.352	.252	5.531
Coopersmith General:	18.724	4.212	.452	17.737
Coopersmith Total:	70.322	16.058	1.722	257.849
Harter Cognitive:	3.054	.543	.058	.294
Harter Social:	2.867	.635	.068	.403
Harter Physical:	2.796	.752	.081	.565
Harter General:	2.900	.603	.364	20.788
Crandall Intrinsic:	24.931	3.592	.385	12.902
Paris Reading:	33.069	3.447	.370	11.879
Cornell Critical:	31.322	8.944	.959	80.000
Error Task:	3.862	2.866	.307	8.213

Achievers (n = 77)

	Mean	Std. Dev.	Std. Error	Variance
Coopersmith School:	5.740	1.681	.192	2.826
Coopersmith Social:	6.130	1.757	.200	3.088
Coopersmith Home:	5.481	2.119	.241	4.490
Coopersmith General:	19.013	4.226	.482	17.855
Coopersmith Total:	72.818	15.322	1.746	234.756
Harter Cognitive:	3.477	.325	.037	.105
Harter Social:	2.907	.598	.068	.358
Harter Physical:	2.656	.757	.086	.573
Harter General:	3.023	.511	.058	.261
Crandall Intrinsic:	25.364	3.445	.393	11.866
Paris Reading:	33.831	3.071	.350	9.432
Cornell Critical:	36.955	8.769	.999	76.903
Error Task:	5.130	3.010	.343	9.062

Grade Six Students (n = 39)

	Mean	Std. Dev.	Std. Error	Variance
Coopersmith School:	5.718	1.605	.257	2.576
Coopersmith Social:	5.744	1.956	.313	3.827
Coopersmith Home:	5.718	2.247	.360	5.050
Coopersmith General:	19.051	3.783	.606	14.313
Coopersmith Total:	72.462	16.003	2.563	256.097
Harter Cognitive:	3.271	.478	.077	.229
Harter Social:	2.769	.712	.114	.507
Harter Physical:	2.787	.806	.129	.650
Harter General:	2.964	.533	.085	.284
Crandall Intrinsic:	25.359	4.158	.666	17.289
Paris Reading:	32.974	3.328	.533	11.078
Cornell Critical:	30.936	9.180	1.470	84.279
Error Task:	3.795	2.386	.382	5.694

Grade Seven Students (n = 46)

	Mean	Std. Dev.	Std. Error	Variance
Coopersmith School:	5.500	2.019	.298	4.078
Coopersmith Social:	6.478	1.656	.244	2.744
Coopersmith Home:	5.652	2.013	.297	4.054
Coopersmith General:	18.978	4.394	.648	19.311
Coopersmith Total:	73.217	15.598	2.300	243.285
Harter Cognitive:	3.173	.535	.079	.286
Harter Social:	2.947	.581	.086	.337
Harter Physical:	2.879	.687	.101	.472
Harter General:	2.987	.574	.085	.329
Crandall Intrinsic:	25.348	2.976	.439	8.854
Paris Reading:	33.130	3.371	.497	11.360
Cornell Critical:	31.772	9.803	1.445	96.108
Error Task:	4.761	2.549	.376	6.497

Grade Eight Students (n = 42)

	Mean	Std. Dev.	Std. Error	Variance
Coopersmith School:	4.643	2.046	.316	4.186
Coopersmith Social:	6.095	1.708	.264	2.918
Coopersmith Home:	4.905	2.564	.396	6.576
Coopersmith General:	18.000	4.537	.700	20.585
Coopersmith Total:	67.452	17.225	2.658	296.693
Harter Cognitive:	3.256	.496	.077	.246
Harter Social:	2.814	.609	.094	.370
Harter Physical:	2.612	.757	.117	.573
Harter General:	2.872	.567	.087	.321
Crandall Intrinsic:	24.857	3.182	.491	10.125
Paris Reading:	33.548	3.651	.563	13.327
Cornell Critical:	35.786	8.584	1.325	73.685
Error Task:	3.714	3.263	.504	10.648

Grade Nine Students (n = 37)

	Mean	Std. Dev.	Std. Error	Variance
Coopersmith School:	5.216	2.043	.336	4.174
Coopersmith Social:	6.108	1.912	.314	3.655
Coopersmith Home:	5.649	2.071	.341	4.290
Coopersmith General:	19.486	4.018	.661	16.146
Coopersmith Total:	72.919	13.430	2.208	180.354
Harter Cognitive:	3.328	.486	.080	.236
Harter Social:	3.014	.546	.090	.298
Harter Physical:	2.621	.770	.127	.593
Harter General:	3.012	.589	.097	.346
Crandall Intrinsic:	24.946	3.873	.637	14.997
Paris Reading:	34.135	2.647	.435	7.009
Cornell Critical:	37.824	7.822	1.286	61.184
Error Task:	5.622	3.419	.562	11.686

APPENDIX B

CASE STUDY VIGNETTES

Case A

Case A was a grade eight girl in the high motive and high strategy group in the first year and the low motive and low strategy group in the second year who was not achieving to expectations. She reported her schooling to be "okay" but was disturbed by the quantity of assigned material. She was unable to present an interesting school subject and described school as being boring. She did, however, express a general interest in Home Economics because she felt the teacher could present information in an interesting manner.

Academics did not appear to be difficult for Case A. Although she described her handwriting as being poor, she took a lot of notes and used them for studying or reviewing material she desired to learn. Case A spent approximately two hours an evening on homework yet her marks were in the 50's and 60's. She described herself as being average in sports and in reading. Case A reported that she rarely reads books on her own and will only read if it is a school assignment. She was the oldest of the family with two brothers and one sister. The family was generally engaged in independent activities.

Of note was Case A's concern about friends. She spoke of her younger classroom grades as a time without friends and with people 'picking' on her. Case A presented her younger self as quiet and passive in confrontational situations. This situation has changed for Case A as she had many friends of her same age. Friends were a higher priority than academics and much of her 'homework' time was spent on the phone talking with colleagues. Although she did not feel she was doing very well, Case A reported that she was satisfied with her current level of performance. Her ambition was to be a fashion designer yet she also desired to attend university.

Case B

Case B was a grade eight boy in the high motive and high strategy group in the first year and in the low motive and high strategy group in the second year who was not achieving to expectations. He described school as being pretty good because of the information he was able to acquire but reported that school occupied too much of one's time. Case B was motivated and utilized sound strategies for material he enjoyed but was unable to discipline himself on material he disliked. Unfortunately, much of the information in school fell under the category of dislikes.

School activities did not appear to be difficult for Case B. What was difficult was his ability to apply himself to tasks he perceived as tedious. He enjoyed tasks that involved doing and creating. Activities such as writing and the academic areas generally were not part of Case B's likes. He described himself as having little difficulty meeting the demands of the task but difficulty motivating himself to do them. He would rather spend time with his friends or read than to expend effort to obtain better marks. His grade point average stood at about 65%. He described himself as being above average in intelligence, spending much of his free time with friends and reading and little time (approximately 1/2 hour a day) doing homework. He was the youngest of the family with one sister. The family was generally engaged in independent activities.

Of note was Case B's concern about his school achievement. He realized he was not doing as well as he could, had accepted his current level of performance, and was unwilling to adopt different strategies to raise his marks. He believed completing high school was important but had no further academic plans beyond this point.

Case C

Case C was a grade seven boy in the high motive and high strategy group who was not achieving to expectations. He was an interesting subject who had undergone a

complete turnabout as a result of a significant personal event. He had changed, in the space of the two year testing period, from a child who had been rebellious and detested school to one who strived to please and to do well academically. His marks, which had been well below average, had begun to rise to a level congruent with his mental abilities.

Case C reported school to be interesting and fun. He was discovering a joy in learning and in a short period of time had progressed through the material he had previously neglected. Case C spent approximately two hours a night on homework. He had maintained contact with his friends who are performing poorly in school, partly to build his own self-esteem, while he discovered his above average potential. Case C had become an avid reader and was engaging in activities such as writing outside the required tasks of class. Although he realized he was not doing as well in school as he could, he expected to continue to improve with effort.

Case C was the youngest child of the family with one brother. His parents divorced when Case C was still an infant and he expressed that family conflicts, mainly initiated by his behaviour, arose after the separation. He did, however, maintain a close relationship with his grandparents. Approximately a year ago his grandfather was dying and at that time expressed disappointment in Case C's behaviour. The disappointment of his grandfather had a significant effect on Case C and he described himself from that point on to have a desire to change. He reported that he quickly discovered that people began to appreciate him and his marks improved significantly at school. Reduced conflicts with teachers and classmates positively reinforced his desires to change. Case C attributed his academic progress to his latent intellectual abilities.

Case D

Case D was a grade eight girl in the high motive and high strategy group who was achieving to expectations. She enjoyed school and viewed it as a source of activities;

however, she expressed difficulty accepting school subjects perceived to be boring because of the repetition of materials.

She was aware of her moods and motivation in school. Case D reported school to be generally motivating and easy. She utilized appropriate strategies for given situations using such procedures as notes for studying and organizational skills for homework completion. Her excellent organization and intellectual abilities reduced the time required to complete homework to somewhat less than one hour a night. When approaching a new task, Case D would practice the required skill, clarify questions, read all the material, go through previous material, plunge into the task, monitor her progress, and seek or ask for help if required.

Case D, an only child, had been engaged in most of the activities of her parents such as visiting parents' colleagues, dinners, hockey games, church activities, and camping. Her interests included stamp collecting, piano, concert band, drama, and reading. She described herself as having an average number of friends with those from school being around her own age and those outside school generally older than herself. She preferred to work with people and valued her friendships. Case D had not experienced conflict between her friendships and her interests and goals in life. She was enrolled in a gifted pull-out program and found the activities of this class exciting and challenging. She described herself as being motivated to learn. Case D expected to attend university although she had yet to decide on an occupation. She had considered such fields as radiology and medicine.

Case E

Case E was a grade eight boy in the high motive and high strategy group who was achieving to expectations. He described himself as enjoying school because of the esteem he received from others on his abilities in academics. He enjoyed school situations when he was allowed to progress ahead of the class once he had acquired an understanding of the

material. Otherwise Case E reported that much of the material in school is boring. He was in a gifted pull-out program which he reported as being extremely stimulating. Case E appreciated Junior High over Elementary since teachers tended to specialize, thereby possessing greater expertise in their subject area.

Case E had consistently been on the honour roll and placed high priority on marks. He approached assignments from a competitive spirit, having one close friend with whom he competes for marks. Case E reported spending approximately three hours a night on homework. He would go beyond assignments, writing and researching reports on a subject he had an interest in even though the area was not a requirement of class. His outside interests included computers, piano, and reading. Case E was the oldest of the family with two brothers and one sister. The family was engaged in a number of activities such as cross country skiing, camping, going for walks, and visiting museums.

Case E described himself as being good at school and poor in sports. Although he would like to be better at sports, he was not concerned about his present performance. He planned to attend university and would like to pursue the study of science or computers.

Case F

Case F was a grade eight girl in the low motive and low strategy group who was not achieving to expectations. She described school as being "all right" but complained about the amount of homework. She had also missed a number of school days due to having had "appendicitis a couple of times". Case F appeared to have received mixed messages from school, in some areas doing well and in others having a great degree of difficulty.

Case F spent approximately two to three hours an evening on homework and felt she could do better in school if she spent more time studying. She expressed frustration at being smart in school but not receiving good grades. She attributed the poor grades to problems with studying, in particular with memory. Case F reported that she makes an

effort to study and to "keep her mind on subjects such as Math, Science, and Social Studies. She had extreme difficulty remembering facts and details. Case F would have liked to ask the teacher for more help but mentioned she did not do this because she was shy.

Case F believed her marks this year had improved considerably due to the time she spent studying with her friend. Case F's friend had motivated her to study and had helped her to use strategies that would aid her memory. Case F was an avid reader describing herself as always reading a book. She was the youngest of five children, having two of her siblings married and living away from home. She had considered attending university after completing school to become either a physical education teacher or a psychologist. The field of psychology had become a recent interest area, possibly as a result of her attempt to understand herself.

Case G

Case G was a grade seven girl in the low motive and low strategy group who was not achieving to expectations. She described school as being okay because of the way she perceived academics would affect her future. She associated school with future jobs which, at times, was a reward that was too distant. Case G would prefer school if it was more enjoyable and interesting.

School did not appear to be difficult or demanding for Case G. She reported an average of one hour of homework a night. Case G expressed that she felt she could do better in school if she studied more but has weighted this demand with her other desires and was satisfied with her current level of performance. She appeared to prefer the easy solution to problems such as asking others for the answers rather than discovering the solution for herself. Case G would be described as a creative individual, involved in dance, drawing, and poetry. She preferred these activities to school and would not have objected to a greater amount of free time to engage herself in creative ventures. She also

enjoyed reading and described herself as spending a lot of her free time reading. Case G also recognized that other students perceive people who obtain high marks as "weird".

She was the second youngest of the family with two brothers and one older sister. Family activities involved talking, watching television, and some quiet moments together. Case G described her primary motivation to do well in school as the encouragement of her parents and the requirements for future jobs. Case G did hope to attend university after high school to enter the area of science, possibly as a biologist. Her motivation and strategies for improving her academic standing appeared, however, to lie predominantly outside herself.

Case H

Case H was a grade seven boy in the low motive and low strategy group who was not achieving to expectations. He described himself as having a great degree of difficult with school, particularly with completing homework assignments and preventing himself from "screwing up". He was spending time with the school counsellor to deal with his problem of incomplete assignments.

Case H enjoyed activities at school that involved doing, such as typing and projects in science. He reported that he had difficulty producing neat handwriting and maintaining concentration. Throughout the testing and interview time, Case H appeared tired. He was the oldest of three children, having two younger brothers. Home life was difficult for Case H and he reported he did not have much time for homework. He described his home life as tough and every once in a while the situation would become tougher. Case H's father left for work early in the morning and did not return until late at night. His mother worked from noon to midnight and so he had very little contact with his parents. Case H was required to prepare and escort his brothers to school and back home. He prepared supper for the family and was also responsible for the housework activities such as dishes and

vacuuming. He spent most of the time with himself and described his closest friend to be his cousin who visited about once a month.

Case H described himself as a nobody and wished he was more intelligent and better looking. He reported that he felt quite alone and perceived life to be a task. Case H perseverated on being a jet pilot. This strong persistent goal may stem from a desire to remove himself from his environment. He also enjoyed reading escape literature and playing, by himself, fantasy games such as Dungeons and Dragons. Case H expressed that "it would be a boring life if I didn't have any other things like Dungeons and Dragons".

Case I

Case I was a grade eight girl in the low motive and low strategy group who was achieving to expectations. She described school as being boring such that she "hates to wake up in the morning". Case I was a creative student who enjoyed drama since it afforded her an outlet at school for her creativity. She also found reading and writing stories to provide an outlet for her creativity.

School did not appear to be difficult for Case I, however, she expressed difficulty with attending to subjects she reported as being boring. According to Case I, this had resulted in some motivation problems in academic areas. Her strategies for attending and studying were in keeping with those of a surface achiever although she was able to articulate an acceptable strategy for a specific academic problem. Case I described herself and her friends as being fun-loving and creative. She placed high value on her friends as an outlet for her creativity and relief from the boredom of school. Case I considered herself to be a bright individual who was doing well in school and did not desire to put further effort into this area. She hoped to become a veterinarian and with her current effort believed that this was possible.

Case I was able to complete homework assignments in approximately 1/2 hour a night. Her hobbies included writing, singing, and time with friends. She expressed her desire to maintain a balance between "studying" and "having a lot of fun". Case I could express the strategies required to improve her academic standing such as studying, monitoring her homework assignments, and being more attentive in school but was satisfied with her current level of performance. She was well accepted by her family having one older sister. Case I's school performance was satisfactory and her motivation to excel was curbed by her desire to perform enjoyable, creative activities.

Case J

Case J was a grade eight boy in the low motive and low strategy group who was achieving to expectations. He described school as being boring and not enjoyable. He did express an interest in science and outdoor education because the information was more active and participatory. Case J was concerned about completing homework and performing well in school. His desire to please the teacher appeared to compensate for the inappropriate use of strategies when approaching new tasks or using notes.

Case J had few friends in school and reported that students were not attracted to him as it would "ruin their image and stuff like that" to be seen with him. He placed high emphasis on doing well in school although he was constantly considering means to minimize work while maximizing marks and teacher impression. Case J also appeared to credit himself with success and place failure on events outside his control such as illness and unavoidable absence from school.

Case J's interests were in skateboarding, reading, building models, and working on the computer. He also admitted to a large amount of time spent watching television and in between watching tv and supper he was able to accomplish approximately one hour of homework an evening. Case J confessed to doing more than what the teachers asked yet not enjoying the work he was doing. He described himself as having been aggravating to

other classmates most of the time, asking a lot of questions, and having been lazy in subjects not within the academic areas. He was the youngest in the family with three brothers and two sisters. Case J expressed an interest in attending the University of British Columbia to become a marine biologist.

Case K

Case K was a grade seven girl in the low motive and high strategy group who was not achieving to expectations. She did not enjoy school and considered most of the activities to be boring. She did however, appreciate courses with a lot of variation and creativity.

Case K appeared to have difficulty in certain academic areas. She reported problems with writing, particularly as it related to spelling and grammar. She also had difficulty remembering material from one day to the next and may possibly have had visual memory problems. Her strategies tended to be at a tactics level, being more interested in product than in the understanding of the process. Case K's background was from a divorced home. She was living with her mother, step father, and younger step sister and brother. She described herself in a negative way making numerous comparisons with her sister whom she reported as being good. There appeared to be an attempt to be bad out of an inability to compete equally with her younger sister. Over the past year there had been some emotional tension as she had been reunited with her father on a part-time basis after nine years. Case K described her emotions as "feeling down and then up" and believed this had an effect on her achievement in school.

Case K could express strategies to improve her marks such as more studying and attending in class but did not feel she had the ability to improve. Her friends were described as students who misbehaved in school and reserved judgment about Case K. She spent approximately one hour on homework an evening and did not feel confident about handing in assignments unless they had been proofed by her parents. Other evening

activities included swimming, dancing, and approximately two and one half hours of television a night. She described pressure from her mother to do well at school and to enter the law profession. She described her mother as, at one time, desiring to become a lawyer but having put those ambitions aside when she married. Case K also reported that she perceived her mother to be emotionally very dependent on her. She had also considered working as an airline stewardess to accommodate her desire to travel or a counsellor to be able to help people. She believed she would be able to be a good counsellor because of the problems she had experienced. She would also have liked to experience the good feelings after she had helped someone. Case K was not able to express how a person would eventually become a stewardess, counsellor, or lawyer and saw herself attending a college and not a university.

Case L

Case L was a grade seven boy in the low motive and high strategy group who was not achieving to expectations. He did not find school particularly difficult or interesting. He expressed mixed feelings toward formal schooling and perceived school as a place where occasionally you were able to "learn a lot of neat things" but for the most part it was just going "through the motions". Case L had in the past been encouraged by teachers who had "taught me more about stuff than the poor teachers do". He desired to learn but appeared to find more learning opportunities outside the school.

Case L had a number of interests that included swimming, bike riding, skating, time with friends, television (approximately 3 hours an evening), reading, and music. He described himself as accomplished in music being able to play by ear the guitar, piano, and saxophone. Case L reported that his parents spent a great deal of time reading and his mother was an excellent musician. The family, which included a younger brother, was engaged in a number of common activities. Case L believed he would go on to university

but had also considered becoming a chef since he enjoyed cooking. He viewed education as an opportunity for better jobs as well as an opportunity to learn.

Case M

Case M was a grade nine girl in the low motive and high strategy group who was achieving to expectations. She reported school to be all right but at times boring. She reported that some of the required material at school was uninteresting no matter how well a teacher might attempt to present the information. Case M expressed that a good teacher could make the difference in learning and related some of her experiences with poor teachers that left her unmotivated to learn in that subject.

School was generally easy for Case M and she was able to complete her homework, on the average, in 30 to 45 minutes an evening. She had a few close friends in whom she felt comfortable enough to be able to confide. Case M enjoyed reading and writing. She was also involved in swimming, crafts, visiting, and general outside activities. Her verbal vocabulary was well ahead of her age and she was able to express ideas and strategies for solving problems at a high level of performance. She was the youngest member of the family having one brother and a sister. Case M described all the members of the family as avid readers. She described herself as a quiet individual who was creative and had a sense of humor. Case M believed she was doing well at school and anticipated continuing on to university in the area of biology or zoology.

Case N

Case N was a grade seven boy in the low motive and high strategy group who was achieving to expectations. He did not enjoy school and found most of the information presented to be boring. For Case N the material was too easy and he appreciated teachers who would challenge him with appropriate material when his regular work was completed.

After school Case N was involved in hockey, soccer, wrestling, watching television, writing, and reading. He described himself as an avid reader, particularly of magazines in the subject areas of his interest. At school he reported that he was easily distracted by his friends but this did not bother him as he was able to obtain good marks. He was able to express excellent strategies to improve his marks if required but had not felt the need as academics were not difficult. Case N did not enjoy people who "take things too seriously", and described himself as an easy-going individual. He was the youngest of the family with an older sister and a fraternal twin. After high school Case N anticipated that he would attend university to study in the area of computers or engineering but was also open to entering professional hockey.

Case O

Case O was a grade eight girl in the high motive and low strategy group who was not achieving to expectations. She reported school to be boring and enjoyed only those activities she described as fun. Fun was defined as those subjects she was good at and which did not require great effort.

Case O relied heavily upon others for answers and assistance. She did not use notes for studying and had poor homework strategies. On the average she spent a half hour an evening on homework, usually completing only one subject area at a time. Case O also reported problems with memorization and writing creatively. Case O played the violin and the flute and spent time on soccer, skiing, and watching television. She did not enjoy reading, although she expressed little difficulty in comprehending material. Case O's emphasis was on having fun and her friends. She anticipated attending university in the area of zoology after completion of high school. Her parents were supportive of her decision and encouraged her to consider university. Case O was the middle child of the family having two brothers.

Case P

Case P was a grade eight boy in the high motive and low strategy group who was not achieving to expectations. He appreciated school because "it will give me a future". He enjoyed those subjects in which he obtained high marks and reported coaching from his mother in academic areas before entering school.

Case P was the older child in the family, having two brothers and two sisters. His parents immigrated to Canada when he was very young. Case P considered English to be his primary language although he had been learning his parents' native language. He reported that the study of both languages had in the past created confusion. Case P was a very competitive individual in academic areas with high ambitions for his future. He expressed a desire to be "better than others". His ambitions after high school involved obtaining a doctorate degree in Biology and Engineering.

Case P expressed problems at school with interpersonal relations. He was promoted from grade one to grade three and reported that the majority of his friends were one grade behind. In a number of questions he referred to his small statue as having created problems and involved him in a number of aggressive acts against his colleagues. He appeared to be very sensitive about his height. Case P was a loner, had few friends, and preferred to be alone. He was the only student who expressed a greater desire, if given the choice, to be involved in individual rather than team sports because "I know I can count on myself". He spent two to three hours a night on homework, the highest time of the students interviewed, yet reported that he was either unable to or forgot to complete some assignments. Although he spent a large amount of time on school work, he did not appear to be well organized or to make efficient use of his time. With the time remaining in the day, Case P reported reading a large portion of time as well as involvement in writing, drawing, science projects, computers, playing chess, and other creative projects.

Case Q

Case Q was a grade eight girl in the high motive and low strategy group who was achieving to expectations. She had no definite profile according to Biggs' model of learning other than a general ambivalence toward school. She was a creative student who appreciated new activities and teachers who were able to present information in a dramatic manner.

Case Q did not utilize effective strategies, for example, she relied upon her memory for exams and not upon notes or material. On the average she spent about an hour an evening on homework. She spent a lot of time with friends and mentioned that it was not uncommon for her to talk on the phone with friends for two hours a night. She enjoyed shopping and appreciated clothes with "a flair". Case Q played the piano and percussion instruments and listened to a wide variety of music from rock to classical. She described herself as a naive person who was happy most of the time. She was naive in accepting information without critically evaluating the source and logical connections. Case Q had a younger brother whom she described as the opposite since he was a perfectionist. After completing high school Case Q planned to continue on to university possibly as a marine biologist, lab technician, or advertising agent. She felt her performance was satisfactory in school but did not perceive herself to be an exceptionally intelligent individual.

Case R

Case R was a grade eight boy in the high motive and low strategy group who was achieving to expectations. He enjoyed school or more accurately 'learning'. In the interview, Case R demonstrated excellent transfer from divergent to convergent thinking and back again. He had excellent communicative skills and a mature outlook on life.

In every subject area, Case R was able to present areas of interest. He essentially reported all subjects offered at school to be useful but did not understand the usefulness of

every activity. He expressed that "learning about transitive and intransitive verbs is all very nice but it is kind of boring. Reading a story is much more exciting and more purposeful, you enjoy it". He disliked having to memorize facts stating that if he had the opportunity to change school he "would not be drilling facts into the kids and instead making it more of a learning process. ...making school so that students want to learn, they would show pride in their work and not just learning as something you have to do". Case R desired to learn rather than just meet the requirements of school. This desire at times interfered in school tasks. Case R felt he could have improved his marks at school "if I just followed the teacher's instructions more, I tend to do my own way of doing an assignment."

Case R was the youngest in the family having two brothers and one sister. The family was involved together in a number of challenging and academic areas. Case R was an avid reader of books, newspapers, and periodicals such as the Financial Times and Time Canada. He described himself as being well coordinated and was involved in hockey, cross country skiing, outdoor activities, football, soccer, baseball, and cycling. Case R worked in a grocery store and described the experience as interesting and educational. He was a people person and at work he reported "it's interesting to talk to different groups of people, like whether it be an elderly lady or some guy, and you know you can talk to them." Case R's time for homework varied with the amount of work but he reported an average of one and one half hour an evening. Case R intended to continue on to university, possibly in the area of business or engineering. He had not ruled out investing and entering business for himself.

Case S

Case S was a grade nine girl who was achieving to expectations in the first year of the study and in the second year was classified as an underachiever. She presented herself as a student who was highly motivated to learn and high on strategies. Case S described school as okay but with some boring subjects. She had spent a number of challenging

summers in special camps for gifted students and reported school to be boring. Case S reported that the information at school was not always that interesting and was mainly teacher directed.

Case S had travelled extensively with her parents and younger brother. She had had a number of enriching experiences outside the school environment. Her interests were reading, dancing, horseback riding, and water and downhill skiing. She described herself as a quiet individual with a number of close friends. Case S appeared to be a well organized individual who utilized excellent strategies which enabled her to spend only about 30 minutes an evening on homework. She was satisfied with her current level of performance in school and anticipated an environment more conducive to learning when she would enter high school. Case S would have appreciated a wider choice of subjects to study at school. She expressed frustration at having to take the same subjects as everyone else and with teachers who were not able to present information in an interesting manner.

Case T

Case T was a grade nine boy who was achieving to expectations in the first year of the study and in the second year would be classified as an underachiever. He presented himself as a student who was high on strategies but low on motivation. Case T described school as being boring and repetitive. He expressed a dislike for the material he was required to learn and described the information as impractical and useless unless a person expected to be in that field. Although Case T reported that learning about the world was important, he felt that the material presented in school was only useful to be able to go into the next class and "recite it again". He found math, his best subject, to be particularly guilty of repetition.

Case T described good teachers as individuals who were able to impart to students a positive attitude towards learning and who were able to create a thinking environment. Case T had excellent strategies for completing his homework and good organizational skills

enabling him to spend on the average 20 minutes a night. Case T, however, detested homework, describing it as a worthless task since "you will either get them all right because you understand all of it, or you'll go home and waste half an hour doing it and then get it all wrong and you'll have to go back to class and be taught it properly again anyway". Case T admitted to being lazy when it came to school work but expressed that he felt he was achieving at an adequate standard. He reported an expectation of working harder in high school when "it really counts".

Case T had a number of friends he spent time with both from the school and from his home area. He enjoyed talking with his friends, was involved with Cadets, enjoyed reading, made models, skied, and played role games such as Dungeons and Dragons. The family, composed of Case T and his younger brother, were involved in a number of group activities. Case T had not considered the area he will enter after high school but had definite plans for university. He described himself as "concentrating on the future a lot, and ignoring short range problems".

Case U

Case U was a grade eight boy who was not achieving to expectation in the first year of the study and in the second year would be classified as an achiever. He presented himself as a student who was low on motivation and whose strategies varied from surface to achieving. Case U described school as boring and he felt he came to school for no real good reason. He reported that he was not a morning person and resented having to come to school so early in the morning. Case U engaged in as little homework as possible, approximately 30 minutes a day, and mentioned he sometimes "gets so sick of the work he does not do it". He emphasized that school was boring and of little value.

Outside of school, Case U was involved in a number of physical activities such as hockey, swimming, skiing, and bike riding. He described himself as an avid reader but did not enjoy the books assigned in school. He was the second oldest in the family with

three brothers and two sisters. He anticipated completing high school and continuing on to university in the area of medicine or marine biology. These goals were long-range and Case U mentioned that he tended to "only care about what's happening right now".